

4th Grade Mathematics

Curriculum Committee Members

Mary Abegg, Keeven Elementary
Nichole Alexander, Jury Elementary
Toni Grimes, Garrett Elementary
Lesli Henderson, Lusher Elementary
Karen Hoelscher, Lusher Elementary
Renee Jenner, Walker Elementary
Michelle Prather, Jury Elementary
Adrian Sperduto, Townsend Elementary

Dr. Nevels Nevels, Mathematics Curriculum Coordinator

Reviewed by Elementary School Math Teachers on January 25, 2017

Reviewed by Curriculum Advisory Committee on February 16, 2017

Approved by the Board of Education on June 20, 2017

TABLE OF CONTENTS

4th Grade Mathematics

Hazelwood School District Mission Statement	3
Hazelwood School District Vision Statement	3
Hazelwood School District Goals.....	3
Curriculum Overview.....	4
4 th Grade Assessments.....	8
4 th Grade Unit 1.....	76
4 th Grade Unit 2.....	85
4 th Grade Unit 3.....	94
4 th Grade Unit 4.....	103
4 th Grade Unit 5.....	116
4 th Grade Unit 6.....	127
4 th Grade Unit 7.....	140
4 th Grade Unit 8.....	151

Hazelwood School District

Mission Statement

We are a collaborative learning community guided by a relentless focus to ensure each student achieves maximum growth.

Vision Statement

HSD will foster lifelong learners, productive citizens and responsible leaders for an ever-evolving society.

Board of Education on January 5, 2010

Goals

Goal #1: Hazelwood students will meet or exceed state standards in all curricular areas with emphasis in reading, writing, mathematics, science and social studies.

Goal #2: Hazelwood staff will acquire and apply skills necessary for improving student achievement.

Goal #3: Hazelwood School District, the community and all families will support the learning of all children.

Mathematics Curriculum Overview

The Hazelwood School District's (HSD) most recent adoption of elementary mathematics curriculum occurred in 2009. In 2010, Missouri officially adopted the Common Core State Standards and subsequently created and adopted the Missouri Learning Standards in 2016. These changes in state standards and learning progressions have resulted in the need for an intensive curriculum revision to ensure that all students in the Hazelwood School District are adequately prepared to meet grade-level learning expectations and be prepared for entry into college, or equipped to begin securing a career.

During the 2016-2017 school year, HSD piloted Investigations in Number, Data & Space 3rd Edition in 13 classrooms across the district. All pilot teachers were enamored with the updates to the curricular materials and were pleased with the strong alignment to the Missouri Learning Standards. Additionally, as of January 2017, the pilot teachers in grades 3-5 had an average of 46.2% of students meeting proficiency, compared to the district's 38.8% as measured by Evaluate mathematics benchmark assessment. Furthermore, 2016 Missouri Assessment Program data results for Grades 3-5 indicates a need for strengthening our current mathematics curriculum as the district's mathematics students scoring proficient and advanced fell to 34.6% from 37.1%. After a careful review of state and district data, it was determined by the Curriculum Department to revise the curriculum to align with the most recent state adopted standards.

The committee members aligned the curriculum with the 2016 Missouri Learning Standards published by Missouri Department of Elementary and Secondary Education. The curriculum meets all of the state and district requirements for research, technology, workplace readiness skills, gender/racial equity, and disability awareness.

The curriculum contains learning activities and unit assessments components that are rigorous, and outline clear learning expectations. As the curriculum is implemented and taught, the learning activities and assessments may be revised. The assessments are required. The learning activities should be implemented in the order, and with the fervor, as intended by the TERC curriculum writers.

We must be aware that students have mathematical ideas. The curriculum supports all students in developing and expanding those ideas. Also, teachers are engaged in ongoing learning about mathematics content, pedagogy, and student learning. The curriculum supports them in this learning. Moreover, teachers collaborate with the students and curriculum materials to create the curriculum as enacted in the classroom. The curriculum provides a clear, focused, and coherent mathematical agenda and supports teachers in implementing in a way that accommodates the needs of their particular students. Most of the learning activities are very sequential and, when all of them are used, a student should be able to successfully complete the unit assessments.

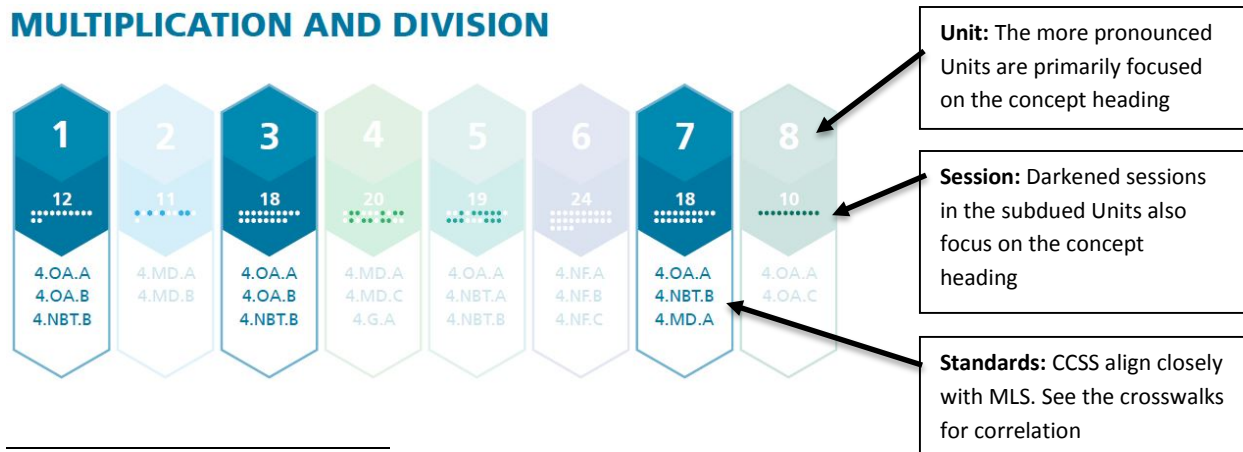
Mathematics Implementation Plan

The Investigations curriculum requires 55–60 minutes of math time a day in Kindergarten and 70–75 minutes a day in Grades 1–5. This includes a 45-minute (for Kindergarten) or 60-minute session (for Grades 1–5) and 10–15 minutes outside of math time for the daily Classroom Routine (Kindergarten–Grade 2) or Ten-Minute Math (Grades 3–5) activity. Each curriculum unit consists of 2–5 investigations. An investigation focuses on a set of related mathematical ideas, coordinating students’ work in hands-on activities, written activities, assessments, and classroom discussions over a period of several days. The duration of an investigation ranges from 4–9 class sessions. Each session begins with a list of all of the activities to help you plan the math time for the day. It is important to move through all of the activities because they are carefully designed to offer coherent and focused work on the main math ideas of the unit.

Mathematics teaching and learning, at its best, is a collaboration among teachers, students, and the curriculum. The curriculum materials provide a coherent, carefully sequenced core of mathematics content for students and supportive professional development material for teachers. Modifying the curriculum and making it work in your classroom requires knowing the curriculum well. It means taking the time to understand the mathematical focus of each lesson, how the Math Focus Points build over many lessons, and how the Mathematical Practices are integrated into the content. Learning the curriculum well means holding back the urge to change activities because you think they are too easy or too difficult for your students before you have tried them and actually seen your students’ work. Keep in mind that the way ideas are developed and sequenced has been researched and tested in multiple classrooms¹, and many suggestions for accommodations are already built into the curriculum.

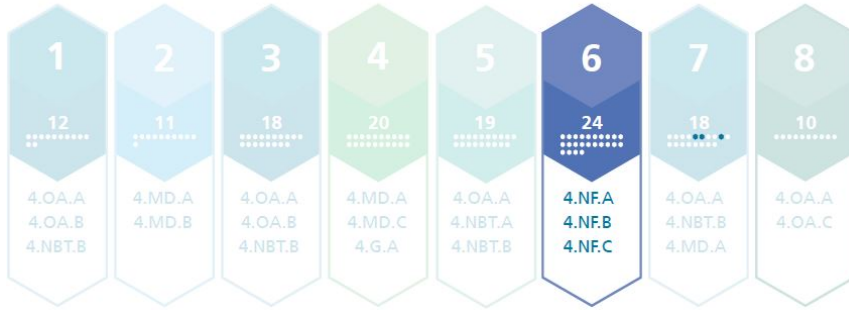
Moreover, the curriculum has been written in a coherent manner and is horizontally and vertically connected. This means that several mathematics ideas and concepts are purposefully introduced in a particular sequence and over a period of time. Therefore, the curriculum should be presented in order, without omitting any session. The following charts below provide a visual of the spiraling of major concepts for grade 4. The darkened dots appear as sessions within units having another major focus.

MULTIPLICATION AND DIVISION



¹ http://assets.pearsonschool.com/asset_mgr/current/201021/PEAR_ResSum_InvMath_LoRes.pdf

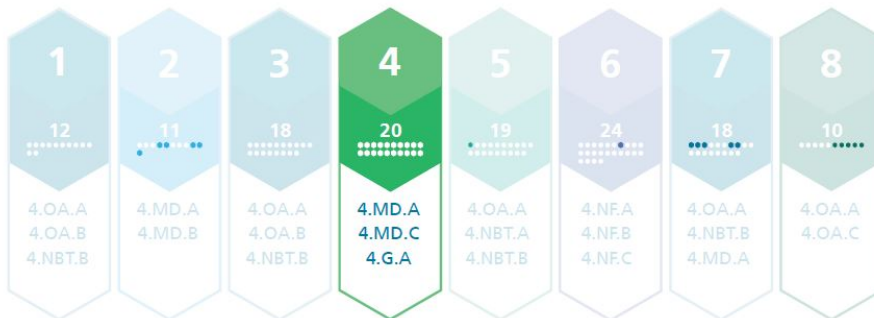
FRACTIONS AND DECIMALS



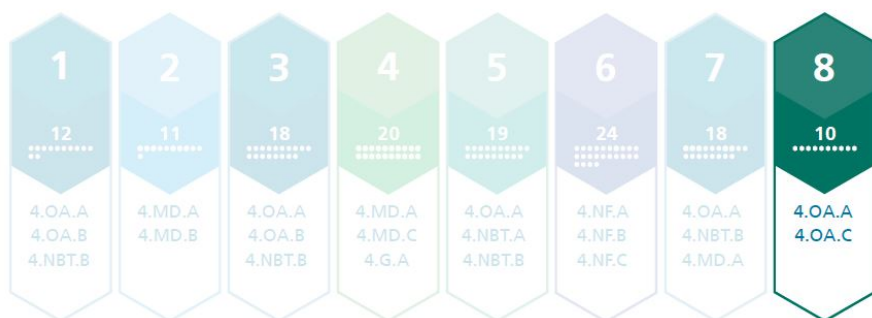
ADDITION, SUBTRACTION, AND THE NUMBER SYSTEM



2-D GEOMETRY AND MEASUREMENT



ANALYZING PATTERNS AND RULES



MODELING WITH DATA



The HSD approach to assessing student learning is a comprehensive, carefully woven one that makes use of multiple sources of data: student written work, written assessments, and informal and formal observation of student behaviors and interactions. These multiple sources of data allow for a more in-depth portrait of each student's understandings of and proficiencies with key mathematical concepts, helping teachers provide more targeted instructional support. Assessments are tied to Unit Benchmarks that set clear expectations for what students should know and be able to do. These assessments include Embedded Assessments, Quizzes, and Assessment Checklists. Embedded Assessments in each curriculum unit are written activities that provide information on students' progress toward the Benchmarks. Starting in Grade 1, students encounter a Quiz every 5 to 10 sessions. These assessments have the dual purpose of providing evidence of students' progress towards meeting the Benchmarks and offering students exposure to the types assessment items that they are likely to encounter on the Missouri Assessment Program Grade Level Assessments. Finally, some Benchmarks are best assessed by observing students as they are actively engaged in doing mathematics. Because younger students are learning how to communicate their understanding through reading problems and writing responses, Assessment Checklists are used more often in Kindergarten and Grade 1 than in Grades 2–5.

Additional components that are germane to successful implementation of the curriculum include some combination of these five parts on a daily basis: Activity, Discussion, Math Workshop, Assessment Activity, and Session Follow-Up.

ACTIVITY: An Activity is where mathematical ideas are introduced and investigated. Activities are organized as work for the whole class, pairs, small groups, or individuals. Many activities are available as digital presentations, some of which include digital tools. Activities typically require 30-45 minutes.

Discussion: Many sessions include a whole-class Discussion, during which students share strategies and conclusions and compare methods and results. A subset of the session's Math Focus Points helps you guide each discussion. It is essential to allow time for class discussions, giving students an opportunity to articulate their own ideas, compare solutions, and consolidate their understanding. Discussions require 15-20 minutes.

Math Workshop: Some sessions include a Math Workshop, where students choose from and complete a set of activities. Students work individually, in pairs, or in small groups for 30-45 minutes during Math Workshop.

Assessment Activity: Some sessions include an Assessment Activity, where students are assessed on their progress toward unit specific Benchmarks through both written activities and observations. The Assessment Activities range from 10-40 minutes.

Session Follow-Up: Every session has a Session Follow-Up section where details about the review and practice assignments are found. Daily Practice offers ongoing review of materials from previous units or practice of content in the current unit. These practice activities can be completed in class or for homework. Homework offers practice with the content of the unit, review of previous content, or preparation for an upcoming activity.

COURSE TITLE: Investigations in Number, Data and Space

GRADE LEVEL: 4th Grade

CONTENT AREA: Mathematics

Course Description:

Students interpret multiplication as a comparison, and they develop strategies to solve them while contrasting those problems with additive comparison problems they are more familiar with. Students apply new knowledge about factors and multiples to what they already know about properties of the operations. They continue to work with area models and number lines to extend their knowledge of fractions as parts of a whole that is divided into equal parts. Students use their visual representations to compare fractions of different numerators and denominators and find equivalent fractions —especially to landmarks such as 0, $\frac{1}{2}$, and 1, which are used to compare fractions and check for reasonableness in computations. Students interpret addition and subtraction of fractions as combining or separating parts of the same whole. The place-value activities in 4th grade focus on developing knowledge of how the powers of 10 serve as important landmarks within the system. It is important that students develop a sense of magnitude based on these landmarks. Students compare and contrast different strategies, including the U.S. standard algorithms, to see how they work and to consider the conditions which affect their appropriateness. Students focus on categorizing quadrilaterals and triangles in. They classify quadrilaterals by the number of parallel and/or perpendicular sides, and they classify triangles by the size of their angles. Students learn that angles are measured in terms of an amount of turn or rotation that is part of a circular arc, that the amount can be measured in degrees, and that angles are additive. Students revisit Grade 3 work on finding area and perimeter of rectangles, and they apply the formulas to solve problems. They learn about line symmetry (also called mirror symmetry) and recognize and draw lines of symmetry within shapes. Students are presented situations in which there is a starting amount and a constant amount of increase. They study the patterns created in these situations by placing the numbers in a table, and they are encouraged to solve problems by using the patterns.

Course Rationale:

Investigations in Number, Data, and Space is a K–5 mathematics curriculum designed to engage students in making sense of mathematical ideas. The curriculum is designed to: support students to make sense of mathematics and learn that they can be mathematical thinkers; focus on computational fluency with whole numbers as a major goal of the elementary grades; provide substantive work in important areas of mathematics—rational numbers, geometry, measurement, data, and early algebra—and the connections among them; emphasize reasoning about mathematical ideas; communicate mathematics content and pedagogy to teachers; and engage the range of learners in understanding mathematics.

Course Scope and Sequence

Unit 1: MULTIPLICATION AND DIVISION 1 (Approx. 12 days)	Unit 2: MODELING WITH DATA (Approx. 11 days)	Unit 3: MULTIPLICATION AND DIVISION 2 (Approx. 18 days)
--	---	--

Unit 4: 2-D GEOMETRY AND MEASUREMENT (Approx. 20 days)	Unit 5: ADDITION, SUBTRACTION, AND THE NUMBER SYSTEM (Approx. 19 days)	Unit 6: FRACTIONS AND DECIMALS (Approx. 24 days)
Unit 7: MULTIPLICATION AND DIVISION 3 (Approx. 18 days)	Unit 8: ANALYZING PATTERNS AND RULES (Approx. 10 days)	

Essential Terminology/Vocabulary

Multiplication, array, dimension, factor, prime number, composite number, square number, product, Data, bar graph, line plot, Array, factor, product, division, remainder, multiple, doubled, halved, Foot, inch, yard, centimeter, meter, linear measurement, U.S. Standard System, metric system, perimeter, polygon, point, vertex, line segment, side, line, parallel, perpendicular, angle, trapezoid, equilateral triangle, parallelogram, hexagon, quadrilateral, trapezoid, line segment, ray, acute angle, obtuse angle, obtuse angle, right angle, degrees, degree, protractor, mirror symmetry, line symmetry, line of symmetry, Addition strategies, subtraction strategies, place value, Fraction, denominator, numerator, equivalent, thirds, sixths, twelfths, decimal, decimal point, one tenth, one hundredth, Weight, mass, capacity, estimate, multiplication, multiple, factor, division, divisor, remainder, Representation, expression, equation.

Unit Objectives:

Unit 1: MULTIPLICATION AND DIVISION 1 (Approx. 12 days)

- Use multiplication and solve multiplication comparison problems.
- Determine whether numbers up to 100 are prime or composite.
- Find factors of numbers up to 100 and recognize multiples of 1-digit numbers.

Unit 2: MODELING WITH DATA (Approx. 11 days)

- Use a line plot to organize, represent, and analyze measurement data about two groups in order to compare the two groups.
- Design a data question that involves measurement to compare two graphs.
- Use a line plot to represent measurement data that includes fractions.

Unit 3: MULTIPLICATION AND DIVISION 2 (Approx. 18 days)

- Multiply 2-digit numbers by 1-digit and small 2-digit numbers using strategies that involve breaking the numbers apart.
- Solve division problems including some that result in a remainder.
- Multiply a number by a multiple of 10.

Unit 4: 2-D GEOMETRY AND MEASUREMENT (Approx. 20 days)

- Convert linear measurement from a larger unit to a smaller unit.
- Determine the perimeter and area of rectangles, including using generalizable methods.
- Draw and identify lines and angles, including parallel and perpendicular lines, and classify polygons by properties of their sides and angles.

- Add or subtract angles to determine the size of the angles.
- Use a protractor to measure angles and sketch angles of specific sizes.

Unit 5: ADDITION, SUBTRACTION, AND THE NUMBER SYSTEM (Approx. 19 days)

- Read, write, and compare numbers up to 1,000,000 and round them to any place.
- Fluently solve multi-digit addition and subtraction problems using a variety of strategies, including the U.S. standard algorithm.
- Use addition and subtraction to solve word problems involving measurement.

Unit 6: FRACTIONS AND DECIMALS (Approx. 24 days)

- Identify equivalent fractions and explain why they are equivalent.
- Compare fractions with like and unlike denominators.
- Add and subtract fractions and mixed numbers with like denominators.
- Multiply a fraction by a whole number.
- Read, write, and compare decimals in tenths and hundredths.
- Add tenths and hundredths.
- Represent data on a line plot including fourths and eighths.

Unit 7: MULTIPLICATION AND DIVISION 3 (Approx. 18 days)

- Multiply two 2-digit numbers and up to a 4-digit number by a 1 digit number.
- Solve division problems with up to 4-digit dividends and a 1-digit divisors.
- Solve measurement and conversion problems.

Unit 8: ANALYZING PATTERNS AND RULES (Approx. 10 days)

- Generate a number pattern that follows a given rule and analyze features of the pattern in order to solve problems.
- Model the mathematics of a situation with tables and with mathematical notation, including using letters to represent unspecified quantities.
- Solve multi-step word problems using the four operations.

Approved Course Materials and Resources:

Investigations in Number, Data, and Space 3rd Edition
Pearson Education, Inc.
Copyright © 2017