



COLLEGE AND CAREER READY

A WORLD-CLASS EDUCATION FOR MILITARY-CONNECTED STUDENTS

FOURTH GRADE

MATHEMATICS CURRICULUM FRAMEWORK





INTRODUCTION

SCOPE AND SEQUENCE

Unit 1:	Multiples, Factors and Larger Numbers.....	5
Unit 2:	Understanding Fraction Operations and Equivalence	00
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Unit 4:	Solving Problems Involving Multiplicative Comparison and Measurement	00
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CRITICAL AREAS OF FOCUS

In fourth grade, instructional time should 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; **(2)** developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; **(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.

(1) 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) 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) 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 in Fourth Grade

The State Standards for Mathematical Practice are practices expected to be integrated into every mathematics lesson for all students Grades K-12.

1. Make sense and persevere in solving problems

Mathematically proficient students in fourth grade 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 students in fourth grade 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. Students 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

Mathematically proficient students in fourth grade may construct arguments using concrete referents, such as objects, pictures, and drawings. They explain their thinking and make connections between models and equations. Students 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 students in fourth grade 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.

This document was adapted from the North Carolina Department of Education (NCDE) State Standards for Mathematical Practice for the use by The Department of Defense Education Activity (DoDEA).

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Standards for Mathematical Practice in Fourth Grade *(continued)*

The State Standards for Mathematical Practice are practices expected to be integrated into every mathematics lesson for all students Grades K-12.

5. Use appropriate tools strategically

Mathematically proficient students in fourth grade 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

Mathematically proficient students in fourth grade develop their mathematical communication skills, by using 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.

7. Look for and make use of structure

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

8. Look for and express regularity in repeated reasoning

Mathematically proficient 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 to write equivalent fractions.

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COLLEGE AND CAREER READY

A WORLD-CLASS EDUCATION FOR MILITARY-CONNECTED STUDENTS

FOURTH GRADE – UNIT 1

Multiples, Factors, and Larger Numbers

Fourth grade students begin the year continuing their development of multiplication and division understanding, applying skills in various mathematical situations. To reach fluency by end of year, students are introduced to the following skills early on and given ample time to develop and apply their understanding:

- Develop an understanding of multiples and factors to apply to multiplication situations
- Develop an understanding of prime and composite numbers
- Refine computational and problem solving strategies to apply to multiplication of large numbers and division with remainders
- Explore area and perimeter in relation to multiplication and division



Stage 1 – Desired Results

ESTABLISHED GOALS

Standards for Mathematical Content

Number and Operations in Base Ten – 4.NBT

Use place value understanding and properties of operations to perform multi-digit arithmetic.

5. Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
6. Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Measurement and Data – 4.MD

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller.

3. Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*

Operations and Algebraic Thinking – 4.OA

Use the four operations with whole numbers to solve problems.

3. Solve multi-step word problems posed with whole numbers and having whole number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. ~~Assess the reasonableness of answers using mental computation and estimation strategies including rounding.~~

NOTES



About the notes: Some standards may be revisited several times during the year; others may be only partially addressed in different units, depending on the focus of the unit. Strikethroughs in the text of the standards are used in some cases in an attempt to convey that focus, and notes are included to clarify and provide additional information.

Note: *This standard provides the context of area and perimeter of rectangles to use for problem solving. Students are first introduced to formulas in this unit and make sense of the formulas using their prior work with area and perimeter.*

Note: *This is the first time students are expected to interpret remainders based upon the context. All four operations will be addressed in Unit 4 and the standard will be finalized in Unit 8.*



Stage 1 – Desired Results (continued)

ESTABLISHED GOALS

Gain familiarity with factors and multiples.

4. Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.
5. Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule “Add 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.

Standards for Mathematical Practice

- [MP.1](#) – Make sense of problems and persevere in solving them.
- [MP.2](#) – Reason abstractly and quantitatively.
- [MP.3](#) – Construct viable arguments and critique the reasoning of others.
- [MP.7](#) – Look for and make use of structure.
- [MP.8](#) – Look for and express regularity in repeated reasoning.

NOTES

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Note: When listing multiples of numbers, students may not list the number itself. Emphasize that the smallest multiple is the number itself. Some students may think that larger numbers have more factors. Having students share all factor pairs and how they found them will clear up this misconception. Some students may need to start with numbers with only one pair of factors, then those with two pairs of factors before finding factors of numbers with several factor pairs.

Note: Students use manipulatives to determine whether a number is prime or composite. Although there are shape patterns in arrays, the focus of this unit is number patterns. This standard is repeated in Unit 6, where the focus will be on identifying shape patterns.

Note: The focus of this unit is not necessarily to become fluent in finding all factor pairs, but to use student's understanding of the concept and language to discuss the structure of multiples and factors. (MP.3/MP.7) Students make sense of multi-step problems (MP.1) and reason about how the formulas connect to the context (MP.2). The use of the generalized strategies and formulas provides an opportunity to investigate and use regularity in repeated reasoning (MP.8). Students are also not expected to be fluent in using the standard algorithm for multiplication until the end of fifth grade. Fourth grade students are building crucial foundational conceptual understanding of the meaning of multiplication.



Stage 1 – Desired Results *(continued)*

Transfer

Students will be able to independently use their learning to:

T

- Make sense of and persevere in solving complex, non-routine mathematical problems.
- Express appropriate mathematical reasoning by constructing viable arguments, critiquing the reasoning of others, and attending to precision when representing mathematical solutions.
- Apply quantitative and abstract mathematical knowledge to model mathematical/statistical relationships in order to interpret and analyze real world situations, draw conclusions, solve problems, and make decisions.

Meaning

UNDERSTANDINGS

U

Students will understand:

- Place value strategies can help solve one and two digit math problems.
- There are many different models connecting the important concepts of multiplication, place value, and properties of operations.
- There is a relationship between multiplication and division.
- Numerical patterns can be generated or identified by applying specific rules.
- Perimeter and area are real life applications of multiplication and division.

ESSENTIAL QUESTIONS

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- What real life situations require the use of multiplication or division and how are they modeled?
- What strategies can I use to help me make sense of a written algorithm?
- How can we organize our work when solving a multi-step word problem?
- What strategies can be used to find rules for patterns and what predictions can the pattern support?
- How is multiplication related to division?
- What is the relationship of the quantities in the problem?
- Can you explain the steps you used to solve the problem?



Stage 1 – Desired Results (continued)

Acquisition

Students will know:

- One of the factors in multiplication indicates the number of objects in a group and the other factor indicates the number of groups.
- A whole number is a multiple of each of its factors.
- If a number is prime or composite.
- Products may be calculated using invented strategies.
- Unfamiliar multiplication problems may be solved by using known multiplication facts and properties of multiplication and division.
- Multiplication may be represented by rectangular arrays/area models.
- Place value manipulatives can be used to understand multiplication and division calculation.
- Some division situations will produce a remainder.
- The remainder is interpreted depending on the problem situation.
- The dividend, divisor, quotient, and remainder are related.
- The properties of multiplication and division help us solve computation problems easily and provide reasoning for choices we make in problem solving.
- Visuals, symbols and/or language may be used to explain their reasoning.
- Patterns are generated by following a given rule.
- Unfamiliar multiplication problems may be solved by using known multiplication facts and properties of multiplication and division.
- The formulas for perimeter and area.
- Multiplication and division may be used to find the total number of objects when objects are arranged in equal groups.

K

Students will be skilled at:

- Identifying factors and multiples of numbers 1–100.
- Identifying prime and composite numbers from 1–100.
- Using visuals, symbols and/or language to explain their reasoning.
- Identifying and solving problems including a number pattern following a given rule.
- Solving multi step word problems that include an unknown quantity using multiple strategies.
- Solving four-digit by one-digit and two-digit by two-digit multiplication problems.
- Using place value manipulatives to represent multiplication calculations.
- Solving division problems that include remainders using multiple strategies.
- Using place value manipulatives to represent division calculations.
- Using the relationship between multiplication and division to explain calculations.
- Using multiple strategies to solve multiplication and division problems with unknown quantities.
- Solving real life problems applying the formulas for area and perimeter.

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Stage 2 – Evidence

Evaluative Criteria	Assessment
<p>Assessment #1</p> <ul style="list-style-type: none"> Expands on relationship between multiple and factors. Uses strategies to solve problem. Expands on relationship between multiplication and division. Explains mathematical thinking. <p>Assessment #2</p> <ul style="list-style-type: none"> Create an organized list for multiple-step problem. Understand relationship between whole, half and quarter. Apply concepts of multiplication and division algorithms. 	<p>CURRICULUM EMBEDDED PERFORMANCE ASSESSMENT (PERFORMANCE TASKS) PT</p> <p><i>Curriculum Embedded Performance Assessment (CEPA) #1</i></p> <p>Title: The Baker</p> <p>Goal: To challenge a student to demonstrate understanding of the concepts involved in multiplication and division.</p> <p>Product: A series of tasks challenging the student to demonstrate their understanding of the relationship between multiplication and division in a real world scenario.</p> <p>Criteria for Success: Work will be judged by the attached scoring guide.</p> <p><i>Curriculum Embedded Performance Assessment (CEPA) #2</i></p> <p>Title: The Newspaper</p> <p>Goal: To assess student application of multiplication and division in a multi-step situation.</p> <p>Product: A series of tasks challenging the student to demonstrate their understanding of the relationship between multiplication and division in a real world scenario.</p> <p>Criteria for Success: Work will be judged by the attached scoring guide.</p>
	<p>OTHER EVIDENCE: OE</p> <ol style="list-style-type: none"> Exit Slips Defending answers in group talks Solving real-world



Stage 3 – Learning Events

MODEL LESSONS

Examples of learning events needed to achieve the results identified in Stage 1 and reflected in the assessment evidence specified in Stage 2.

Core lessons, identified with (), are lessons providing opportunities to build the understandings identified in Stage 1. These lessons have been vetted for quality, rigor, and alignment to the desired results. Some lessons provide detailed instructions or recommendations. However, it is important to note that the lessons are not scripts; rather they should be adapted and used to meet the needs of the students within the class. Additional lessons are provided to support the core lessons and to allow for teacher choice.*

Early in Unit		
Task Name	To Develop Understanding of...	Standards
*Factor Finding ³	Finding factors	4.OA.4
*Investing Prime and Composite ³	Finding factors	4.OA.4
*Finding Multiples ³	Finding multiples	4.OA.4
*Exploring Prime and Composite ⁶	Prime and composite using multiples	4.OA.4 4.OA.5
*Determining multiples ⁶	Finding multiples	4.OA.4 4.OA.5
*Finding Products ³	Finding products	4.OA.4
*Finding Factor Pairs ⁶	Factors	4.OA.4 4.NBT.5 4.NBT.6
My Son is Naughty ³	Factors	4.OA.4
Cicadas, Brood X ³	Prime and composite numbers	4.OA.4
Prime vs. Composite ³	Prime and composite numbers	4.OA.4
The Factor Game ³	Recognizing factors as prime and composite	4.OA.4
Factor Trail Game ³	Determining factor pairs	4.OA.4

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ADDITIONAL RESOURCES

Examples of resources to support the development of the desired results identified in Stage 1 and reflected in the assessment evidence specified in Stage 2.

Additional resources are provided to support and supplement the development of the understandings identified in Stage 1, creation of a positive mathematical learning environment, and building of teacher mathematical content knowledge.

Instructional Support

Support Resources

- [Multiplication and Division Observational Checklist](#)
- [Other Resources](#)

enVision Math Connections

- Gain familiarity with factors and multiples
Factors/Multiples
4.OA.4
EnVision Math Topic Lesson
3-2, 3-4, 3-5, 3-6, 8-8, 8-9
- Generate and analyze patterns
Number Patterns
4.OA.5
EnVision 3-2, 6-2, 6-3, 9-7
- Use four operations with whole numbers to solve problems
Multi-step problems
4.OA.3
EnVision 2-2, 2-2, 5-2, 5-4, 6-1, 6-4, 7-2, 7-3a*, 7-7, 8-2, 8-3a*, 8-3, 8-10, 16-12, 18-1, 18-2, 18-3, 18-5



Stage 3 – Learning Events (continued)

Early in Unit (continued)		
Task Name	To Develop Understanding of...	Standards
The Sieve of Eratosthenes ³	Determining numbers less than 100	4.OA.4
Number Riddles ³	Factors and multiples	4.OA.4
Generate and analyze patterns ³	Generating rules	4.OA.5
Earth Day Project ³	Generating rules	4.OA.5
Dozens of Cousins ³	Multi-step word problems	4.OA.3
At the Circus ³	Using partial products	4.OA.3 4.NBT.5
Middle of the Unit		
Task Name	To Develop Understanding of...	Standards
* Models of Multiplication ³	Decomposing multi-digit multiplication problems	4.NBT.5
* Models of Division ³	Multi-step division problems related to area	4.NBT.6
School Store ³	Using properties of multiplication to multiply	4.OA.3 4.NBT.5
Compatible Numbers to Estimate ³	Using compatible numbers to divide	4.OA.3 4.NBT.6
* Brain Only ³	Patterns in multiplication and division	4.NBT.5 4.NBT.6
What is 2500 ÷ 300? ³	Dividing with zeros	4.OA.3 4.NBT.5
The Baker ⁵ (CEPA)	Multi-step word problems, multiplying and dividing multi-digit problems	4.NBT.5 4.NBT.6 4.OA.4 4.OA.5
Rollin for Products ⁵	Multi-digit multiplication game	4.NBT.5

Instructional Support (continued)

- Use place value understanding and properties of operations to perform multi-digit arithmetic
Multi-Digit Multiplication Arithmetic
4.NBT.5
EnVision 5-1., 5-2, 5-3, 5-4, 5-5, 5-6, 5-7, 5-8a, 5-8, 7-1, 7-3a*, 7-3, 7-4a*, 7-4b*, 7-4, 7-5
- Use place value understanding and properties of operations to perform multi-digit arithmetic
Multi-Digit Multiplication Arithmetic
4.NBT.5
EnVision 5-1., 5-2, 5-3, 5-4, 5-5, 5-6, 5-7, 5-8a*, 5-8, 7-1, 7-3a*, 7-3, 7-4a*, 7-4b*, 7-4, 7-5
- Use place value understanding and properties of operations to perform multi-digit arithmetic
Multi-Digit Division Arithmetic
4.NBT.6
EnVision 4-1, 4-2, 4-3, 4-5, 8-1, 8-3a*, 8-3b* 8-3c*, 8-3, 8-4, 8-5, 8-6, 8-7a*, 8-7
- Solve problems involving measurement and conversion of measurements from larger unit to a smaller unit
Area and Perimeter
4.MD.3
EnVision 14-2, 14-6, 14-7a*

*Lessons with a letter are found on the Pearson SuccessNet under additional resources aligned with the Common Core.

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Stage 3 – Learning Events (continued)

Middle of the Unit (continued)		
Task Name	To Develop Understanding of...	Standards
Spinner Show Down ⁵	Multi-digit multiplication game	4.NBT.5
Topper the Towel ⁵	Multi-digit multiplication game	4.NBT.5
Bean Bag Grab Division ⁵	Division practice game	4.NBT.6
Division Golf ⁵	Division practice game	4.NBT.6
Interpreting Remainders ⁵	Division practice game	4.NBT.6
Missing Dimension ⁵	Division practice game	4.NBT.6
Star Power Division ⁵	Division-compare quotient game	4.NBT.6
Treasure Hunt ⁵	Division practice game	4.NBT.6
Later in the Unit		
Task Name	To Develop Understanding of...	Standards
Area and Perimeter ³	Arrays/area and perimeter as related to multiplication and division	4.MD.3
* Chocolate Covered Candies ³	Application of area and perimeter to multiplication/multi-step problems	4.MD.3
* Arrays, Number, Puzzles, and Factors ³	Factors, multiplication, and area	4.OA.3 4.OA.4 4.NBT.5
Amazing Area ³	Application of multiplication to area	4.MD.3
The Newspaper (CEPA)	Multi-step word problems, multiplying and dividing multi-digit problems	4.OA.3 4.OA.5 4.NBT.5 4.NBT.6

Building Teacher Mathematical Capacity

Critical Terminology

Multiples, Factors and Larger Numbers

- Factor
- Multiple
- Prime
- Composite
- Pattern
- Pattern rule
- Product
- Array
- Multiply
- Dividend
- Divisor
- Product
- Partial product
- Distributive property
- Estimate
- Compatible numbers
- Associative Property of Multiplication
- Commutative Property of Multiplication
- Remainder
- Divide
- Quotient

Questions to Develop Mathematical Thinking

- How is multiplication related to division?
- What is the relationship of the quantities in the problem?
- What steps did you use to solve the problem?

Content Progressions and Background

- [Number and Operations in Base Ten Progression](#)
- [Measurement and Data Progression](#)
- [Operations and Algebraic Thinking Progression](#)

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Stage 3 – Learning Events (continued)

Building Teacher Mathematical Capacity (continued)

Connections to Previous and Subsequent Learning

Exploring multiples and factors

- Third grade: Students will work with understanding properties of multiplication and the relationship between multiplication and division.
- Fifth grade: Students will generate numerical patterns using two given rules and identify relationships.

Using multiplication and division strategies with larger numbers

- Third grade: Students will fluently multiply and divide through 100. Students multiply one-digit numbers by multiples of 10 using strategies based on place value. Students represent and solve problems involving multiplication and division.
- Fifth grade: Students will fluently multiply multi-digit whole numbers using the standard algorithm. Students find whole number quotients using two-digit divisors.

[K-8 Learning Trajectories](#) (This could be used to determine remediation needs or enrichment opportunities)



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