Washington State K–8 Mathematics Standards
April 2008

Operations Strand

As they use their knowledge of whole numbers to describe situations that involve joining, separating, and comparing, students in Kindergarten through Grade 2 learn to add and subtract whole numbers and use these operations to solve problems. In Grades 3–5, students learn the meaning of multiplication and division to describe situations that involve joining equal groups and separating sets into equal-sized groups. Students learn to multiply and divide whole numbers, and they select from addition, subtraction, multiplication, and division the appropriate operations needed to solve problems. Also in Grades 3–5, students use their understanding of place value to begin to add and subtract decimals. At the same time, students use what they have learned about the meaning of fractions and equivalent fractions to begin to add and subtract fractions. In Grades 6–8, students apply their understanding of fractions, decimals, and properties of the operations to extend their computational fluency to add, subtract, multiply, and divide rational numbers. Students build on their understanding of multiplication and division to develop important concepts about ratios, rates, and proportional relationships. By the end of high school, students are evaluating expressions and solving equations with real numbers.

This is one of six strand documents that accompany the Washington State K–8 Mathematics Standards, tracking the development of important mathematical ideas and skills across grades K–8. Where content of an expectation may address more than one strand, that expectation may appear in more than one strand document.

Kindergarten

K.1. Core Content: *Whole numbers*

Performance Expectations	***Explanatory Comments and Examples***
Students are expected to:	
K.1.C Fluently compose and decompose numbers to 5.	Students should be able to state that 5 is made up of 4 and 1, 3 and 2, 2 and 3, or 1 and 4. They should understand that if I have 3, I need 2 more to make 5, or that if I have 4, I need only 1 more to make 5. Students should also be able to recognize the number of missing objects without counting. The words *compose* and *decompose* are used to describe actions that young students learn as they acquire knowledge of small numbers by putting them together and taking them apart. This understanding is a bridge between counting and knowing number combinations. It is how instant recognition of small numbers develops and leads naturally to later understanding of fact families. Example: • Here are 5 counters. I will hide some. If you see 2, how many am I hiding?
K.1.H Describe a number from 1 to 9 using 5 as a benchmark number.	Students should make observations such as "7 is 2 more than 5" or "4 is 1 less than 5." This is helpful for mental math and lays the groundwork for using 10 as a benchmark number in later work with base-ten numbers and operations.

Kindergarten

K.2. Core Content: *Patterns and operations*

Performance Expectations	***Explanatory Comments and Examples***
Students are expected to:	
K.2.C Model addition by joining sets of objects that have 10 or fewer total objects when joined and model subtraction by separating a set of 10 or fewer objects.	Seeing two sets of counters or other objects, the student determines the correct combined total. The student may count the total number of objects in the set or use some other strategy in order to arrive at the sum. The student establishes the total number of counters or objects in a set; then, after some have been removed, the student figures out how many are left. Examples: • Get 4 counting chips. Now get 3 counting chips. How many counting chips are there altogether? • Get 8 counting chips. Take 2 away. How many are left?

Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
K.2.D Describe a situation that involves the actions of joining (addition) or separating (subtraction) using words, pictures, objects, or numbers.	Students can be asked to tell an addition story or a subtraction story.

Grade 1

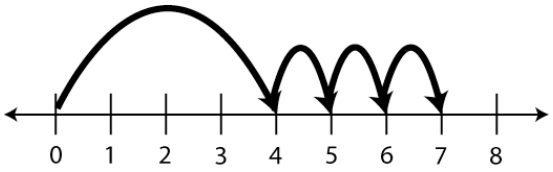
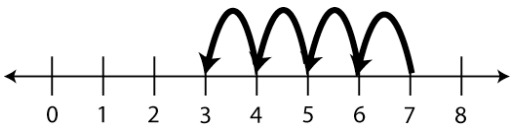
1.1. Core Content: *Whole number relationships*

Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
1.1.F Fluently compose and decompose numbers to 10.	Students put together and take apart whole numbers as a precursor to addition and subtraction. Examples: • Ten is 2 + 5 + 1 + 1 + 1. • Eight is five and three. • Here are twelve coins. I will hide some. If you see three, how many am I hiding? [This example demonstrates how students might be encouraged to go beyond the expectation.]

Grade 1

1.2. Core Content: *Addition and subtraction*

Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
1.2.A Connect physical and pictorial representations to addition and subtraction equations.	The intention of the standard is for students to understand that mathematical equations represent situations. Simple student responses are adequate. Combining a set of 3 objects and a set of 5 objects to get a set of 8 objects can be represented by the equation 3 + 5 = 8. The equation 2 + 6 = 8 could be represented by drawing a set of 2 cats and a set of 6 cats making a set of 8 cats. The equation 9 – 5 = 4 could be represented by taking 5 objects away from a set of 9 objects.

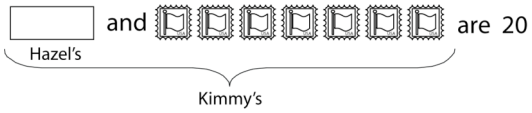
Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
1.2.B Use the equal sign (=) and the word *equals* to indicate that two expressions are equivalent.	Students need to understand that *equality* means *is the same as*. This idea is critical if students are to avoid common pitfalls in later work with numbers and operations, where they may otherwise fall into habits of thinking that the answer always follows the equal sign. Examples: • 7 = 8 – 1 • 5 + 3 equals 10 – 2
1.2.C Represent addition and subtraction on the number line.	Examples: • 4 + 3 = 7  • 7 – 4 = 3 
1.2.D Demonstrate the inverse relationship between addition and subtraction by undoing an addition problem with subtraction and vice versa.	The relationship between addition and subtraction is an important part of developing algebraic thinking. Students can demonstrate this relationship using physical models, diagrams, numbers, or acting-out situations. Examples: • 3 + 5 = 8, so 8 – 3 = 5 • Annie had ten marbles, but she lost three. How many marbles does she have? Joe found her marbles and gave them back to her. Now how many does she have?

Performance Expectations *Students are expected to:*	Explanatory Comments and Examples
1.2.E Add three or more one-digit numbers using the commutative and associative properties of addition.	Examples: • 3 + 5 + 5 = 3 + 10 (Associativity allows us to add the last two addends first.) • (5 + 3) + 5 = 5 + (5 + 3) = (5 +5) + 3 = 13 (Commutativity and associativity allow us to reorder addends.) • This concept can be extended to address a problem like 3 + △ + 2 = 9, which can be rewritten as 5 + △ = 9.
1.2.F Apply and explain strategies to compute addition facts and related subtraction facts for sums to 18.	Strategies for addition include counting on, but students should be able to move beyond counting on to use other strategies, such as making 10, using doubles or near doubles, etc. Subtraction strategies include counting back, relating the problem to addition, etc.
1.2.G Quickly recall addition facts and related subtraction facts for sums equal to 10.	Adding and subtracting zero are included.
1.2.H Solve and create word problems that match addition or subtraction equations.	Students should be able to represent addition and subtraction sentences with an appropriate situation, using objects, pictures, or words. This standard is about helping students connect symbolic representations to situations. While some students may create word problems that are detailed or lengthy, this is not necessary to meet the expectation. Just as we want students to be able to translate 5 boys and 3 girls sitting at a table into 5 + 3 = 8, we want students to look at an expression like 7 – 4 = 3 and connect it to a situation or problem using objects, pictures, or words.

Grade 2

2.2. Core Content: *Addition and subtraction*

Performance Expectations *Students are expected to:*	Explanatory Comments and Examples
2.2.A Quickly recall basic addition facts and related subtraction facts for sums through 20.	

Performance Expectations *Students are expected to:*	Explanatory Comments and Examples
2.2.B Solve addition and subtraction word problems that involve joining, separating, and comparing and verify the solution.	Problems should include those involving take-away situations, missing addends, and comparisons. The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or physical objects. Example: • Hazel and Kimmy each have stamp collections. Kimmy's collection has 7 more stamps than Hazel's. Kimmy has a total of 20 stamps. How many stamps are in Hazel's collection? Explain your answer. [Students may verify their work orally, with pictures, or in writing. For instance, students might give the equation below or might use the picture.] $20 - 7 = 13$ 
2.2.C Add and subtract two-digit numbers efficiently and accurately using a procedure that works with all two-digit numbers and explain why the procedure works.	Students should be able to connect the numerical procedures with other representations, such as words, pictures, or physical objects. This is students' first exposure to mathematical algorithms. It sets the stage for all future work with computational procedures. The standard algorithms for addition and subtraction are formalized in grade three.
2.2.D Add and subtract two-digit numbers mentally and explain the strategies used.	Examples of strategies include • Combining tens and ones: 68 + 37 = 90 + 15 = 105 • Compensating: 68 + 37 = 65 + 40 = 105 • Incremental: 68 + 37 = 68 + 30 + 7 = 105
2.2.E Estimate sums and differences.	Example: • Students might estimate that 198 + 29 is a little less than 230.

Grade 2

2.4. Additional Key Content

Performance Expectations	*Explanatory Comments and Examples*
Students are expected to:	
2.4.C Model and describe multiplication situations in which sets of equal size are joined.	Multiplication is introduced in grade two only at a conceptual level. This is a foundation for the more systematic study of multiplication in grade three. Small numbers should be used in multiplication problems that are posed for students in grade two. Example: • You have 4 boxes with 3 apples in each box. How many apples do you have?
2.4.D Model and describe division situations in which sets are separated into equal parts.	Division is introduced in grade two only at a conceptual level. This is a foundation for the more systematic study of division in grade three. Small numbers should be used in division problems that are posed for students in grade two. Example: • You have 15 apples to share equally among 5 classmates. How many apples will each classmate get?

Grade 3

3.1. Core Content: *Addition, Subtraction, and Place Value*

Performance Expectations	*Explanatory Comments and Examples*
Students are expected to:	
3.1.C Fluently and accurately add and subtract whole numbers using the standard regrouping algorithms.	Teachers should be aware that in some countries the algorithms might be recorded differently.
3.1.D Estimate sums and differences to approximate solutions to problems and determine reasonableness of answers.	Example: • Marla has $10 and plans to spend it on items priced at $3.72 and $6.54. Use estimation to decide whether Marla's plan is a reasonable one, and justify your answer.
3.1.E Solve single- and multi-step word problems involving addition and subtraction of whole numbers and verify the solutions.	The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Grade 3

3.2. Core Content: *Concepts of Multiplication and Division*

Performance Expectations

Students are expected to:

Explanatory Comments and Examples

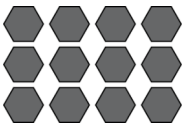
3.2.A Represent multiplication as repeated addition, arrays, counting by multiples, and equal jumps on the number line, and connect each representation to the related equation.

Students should be familiar with using words, pictures, physical objects, and equations to represent multiplication. They should be able to connect various representations of multiplication to the related multiplication equation. Representing multiplication with arrays is a precursor to more formalized area models for multiplication developed in later grades beginning with grade four.

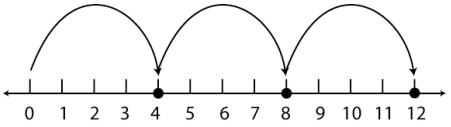
The equation $3 \times 4 = 12$ could be represented in the following ways:

- Equal sets:

- An array:



- Repeated addition: 4 + 4 + 4
- Three equal jumps forward from 0 on the number line to 12:



3.2.B Represent division as equal sharing, repeated subtraction, equal jumps on the number line, and formation of equal groups of objects, and connect each representation to the related equation.

Students should be familiar with using words, pictures, physical objects, and equations to represent division. They should be able to connect various representations of division to the related equation.

Division can model both equal sharing (how many in each group) and equal groups (how many groups).

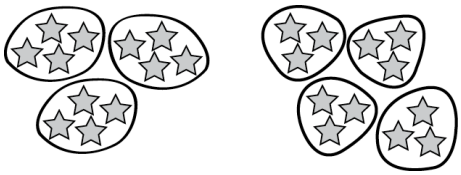
The equation $12 \div 4 = 3$ could be represented in the following ways:

Performance Expectations

Students are expected to:

Explanatory Comments and Examples

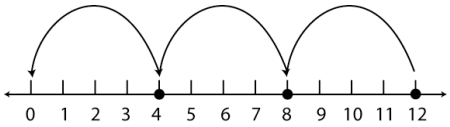
— Equal groups: Equal sharing:



— An array:

— Repeated subtraction: The expression 12 – 4 – 4 – 4 involves 3 subtractions of 4.

— Three equal jumps backward from 12 to 0 on the number line:



3.2.C Determine products, quotients, and missing factors using the inverse relationship between multiplication and division.

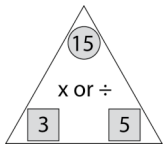
Example:

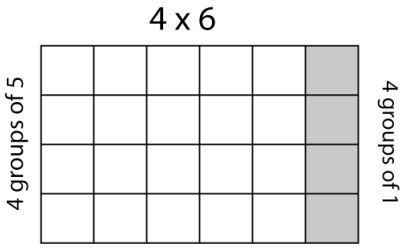
- To find the value of *N* in 3 x *N* = 18, think 18 ÷ 3 = 6.

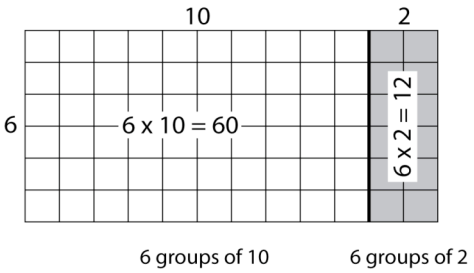
Students can use multiplication and division fact families to understand the inverse relationship between multiplication and division.

Examples:

- $3 \times 5 = 15$ $5 \times 3 = 15$
  $15 \div 3 = 5$ $15 \div 5 = 3$



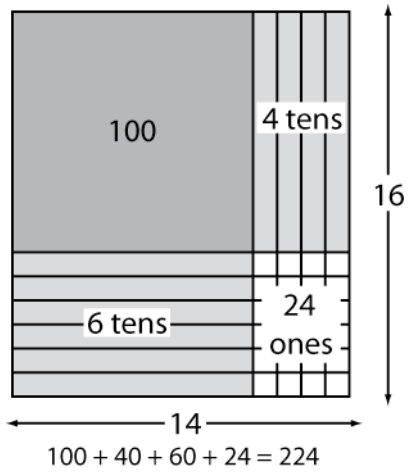
Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
3.2.D Apply and explain strategies to compute multiplication facts to 10 X 10 and the related division facts.	Strategies for multiplication include skip counting (repeated addition), fact families, double-doubles (when 4 is a factor), "think ten" (when 9 is a factor, think of it as 10 – 1), and decomposition of arrays into smaller known parts. Number properties can be used to help remember basic facts. $5 \times 3 = 3 \times 5$ (Commutative Property) $1 \times 5 = 5 \times 1 = 5$ (Identity Property) $0 \times 5 = 5 \times 0 = 0$ (Zero Property) $5 \times 6 = 5 \times (2 \times 3) = (5 \times 2) \times 3 = 10 \times 3 = 30$ (Associative Property) $4 \times 6 = 4\ (5 + 1) = (4 \times 5) + (4 \times 1) = 20 + 4 = 24$ (Distributive Property)  Division strategies include using fact families and thinking of missing factors.
3.2.E Quickly recall those multiplication facts for which one factor is 1, 2, 5, or 10 and the related division facts.	Many students will learn all of the multiplication facts to 10 X 10 by the end of third grade, and all students should be given the opportunity to do so.
3.2.F Solve and create word problems that match multiplication or division equations.	The goal is for students to be able to represent multiplication and division sentences with an appropriate situation, using objects, pictures, or written or spoken words. This standard is about helping students connect symbolic representations to the situations they model. While some students may create word problems that are detailed or lengthy, this is not necessary to meet the expectation. Just as we want students to be able to translate 5 groups of 3 cats into 5 x 3 = 15; we want students to look at an equation like $12 \div 4 = 3$ and connect it to a situation using objects, pictures, or words.

Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
3.2.G Multiply any number from 11 through 19 by a single-digit number using the distributive property and place value concepts.	Example: • 6×12 can be thought of as 6 tens and 6 twos, which equal 60 and 12, totaling 72. 
3.2.H Solve single- and multi-step word problems involving multiplication and division and verify the solutions.	Problems include using multiplication to determine the number of possible combinations or outcomes for a situation, and division contexts that require interpretations of the remainder. The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, physical objects, or equations. Examples: • Determine the number of different outfits that can be made with four shirts and three pairs of pants. • There are 14 soccer players on the boys' team and 13 on the girls' team. How many vans are needed to take all players to the soccer tournament if each van can take 5 players?

Grade 4

4.1. Core Content: *Multi-digit multiplication*

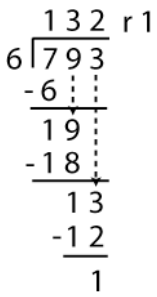
Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
4.1.A Quickly recall multiplication facts through 10 X 10 and the related division facts.	

Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
4.1.C Represent multiplication of a two-digit number by a two-digit number with place value models.	Representations can include pictures or physical objects, or students can describe the process in words (14 times 16 is the same as 14 times 10 added to 14 times 6). The algorithm for multiplication is addressed in expectation 4.1.F. Example: • $14 \times 16 = 224$  $100 + 40 + 60 + 24 = 224$
4.1.D Multiply by 10, 100, and 1,000.	Multiplying by 10, 100, and 1,000 extends place value concepts to large numbers through the millions. Students can use place value and properties of operations to determine these products. Examples: • $10 \times 5{,}000 = 50{,}000$ $100 \times 5{,}000 = 500{,}000$ $1{,}000 \times 5{,}000 = 5{,}000{,}000$ • 40×300 $= (4 \times 10) \times (3 \times 100)$ $= (4 \times 3) \times (10 \times 100)$ $= 12 \times 1{,}000$ $= 12{,}000$

Performance Expectations *Students are expected to:*	Explanatory Comments and Examples
4.1.F Fluently and accurately multiply up to a three-digit number by one- and two-digit numbers using the standard multiplication algorithm.	Example: • 245 x 7 = 1715 (3 3) Teachers should be aware that in some countries the algorithm might be recorded differently.
4.1.G Mentally multiply two-digit numbers by numbers through 10 and by multiples of 10.	Examples: • $4 \times 32 = (4 \times 30) + (4 \times 2)$ • $4 \times 99 = 400 - 4$ • $25 \times 30 = 75 \times 10$
4.1.H Estimate products to approximate solutions to problems and determine reasonableness of answers.	Example: • 28×120 is approximately 30 times 100, so the product should be around 3,000.
4.1.I Solve single- and multi-step contextual problems involving multi-digit multiplication, and justify the solutions.	Justifications can include numbers, words, pictures, physical objects, or equations. Students should be able to use all of these representations as needed. To justify a particular solution, students should be able to explain or show their work using at least one of these representations and verify that their answer is reasonable. Problems could include two-step problems that use operations other than multiplication.
4.1.J Solve contextual problems involving division, and justify the solutions.	Justifications can include numbers, words, pictures, physical objects, or equations. Students should be able to use all of these representations as needed. To justify a particular solution, students should be able to explain or show their work using at least one of these representations and verify that their answer is reasonable. Division problems should reinforce connections between multiplication and division. The example below can be solved using multiplication along with some addition and subtraction. Example: • A class of 22 students shares a box containing 385 animal crackers. What is each student's equal share? How many crackers are left over? Division algorithms, including long division, are developed in fifth grade.

Grade 5

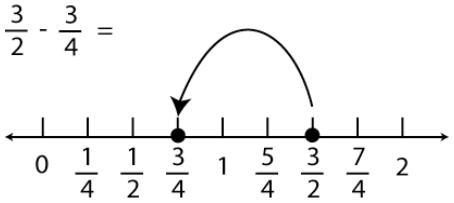
5.1. Core Content: *Multi-digit division*

Performance Expectations	***Explanatory Comments and Examples***
Students are expected to:	
5.1.A Represent multi-digit division using place value models and connect the representation to the related equation.	Students use pictures or grid paper to represent division and describe how that representation connects to the related equation. They could also use physical objects such as base ten blocks to support the visual representation. Note that the algorithm for long division is addressed in expectation 5.1.C.
5.1.B Determine quotients for multiples of 10 and 100 by applying knowledge of place value and properties of operations.	Example: • Using the fact that 16 ÷ 4 = 4, students can generate the related quotients 160 ÷ 4 = 40 and 160 ÷ 40 = 4.
5.1.C Fluently and accurately divide up to a four-digit number by one- or two-digit divisors using the standard long-division algorithm.	The use of 'R' or 'r' to indicate a remainder may be appropriate in most of the examples students encounter in grade five. However, students should also be aware that in subsequent grades, they will learn additional ways to represent remainders, such as fractional or decimal parts. Example: •  Teachers should be aware that in some countries the algorithm might be recorded differently.
5.1.D Estimate quotients to approximate solutions and determine reasonableness of answers in problems involving up to two-digit divisors.	Example: • The team has saved $45 to buy soccer balls. If the balls cost $15.95 each, is it reasonable to think there is enough money for more than two balls? Problems like 54,596 ÷ 798, which can be estimated by 56,000 ÷ 800, while technically beyond the standards, could be included when appropriate. The numbers are easily manipulated and the problems support the ongoing development of place value.

Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
5.1.E Mentally divide two-digit numbers by one-digit divisors and explain the strategies used.	
5.1.F Solve single- and multi-step word problems involving multi-digit division and verify the solutions.	The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations. Problems include those with and without remainders.

Grade 5

5.2. Core Content: *Addition and subtraction of fractions and decimals*

Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
5.2.A Represent addition and subtraction of fractions and mixed numbers using visual and numerical models, and connect the representation to the related equation.	This expectation includes numbers with like and unlike denominators. Students should be able to show these operations on a number line and should be familiar with the use of pictures and physical materials (like fraction pieces or fraction bars) to represent addition and subtraction of mixed numbers. They should be able to describe how a visual representation connects to the related equation. Example: 
5.2.B Represent addition and subtraction of decimals using place value models and connect the representation to the related equation.	Students should be familiar with using pictures and physical objects to represent addition and subtraction of decimals and be able to describe how those representations connect to related equations. Representations may include base ten blocks, number lines, and grid paper.
5.2.E Fluently and accurately add and subtract fractions, including mixed numbers.	Fractions can be in either proper or improper form. Students should also be able to work with whole numbers as part of this expectation.

Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
5.2.F Fluently and accurately add and subtract decimals.	Students should work with decimals less than 1 and greater than 1, as well as whole numbers, as part of this expectation.
5.2.G Estimate sums and differences of fractions, mixed numbers, and decimals to approximate solutions to problems and determine reasonableness of answers.	Example: • Jared is making a frame for a picture that is $10\frac{3}{4}$ inches wide and $15\frac{1}{8}$ inches tall. He has a 4-ft length of metal framing material. Estimate whether he will have enough framing material to frame the picture.
5.2.H Solve single- and multi-step contextual problems involving addition and subtraction of whole numbers, fractions (including mixed numbers), and decimals, and justify their solutions.	Justifications can include numbers, words, pictures, physical objects, or equations. Students should be able to use all of these representations as needed. To justify a particular solution, students should be able to explain or show their work using at least one of these representations and verify that their answer is reasonable. Multi-step problems may also include previously learned computational skills like multiplication and division of whole numbers.

Grade 6

6.1. Core Content: *Multiplication and division of fractions and decimals*

Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
6.1.B Represent multiplication and division of non-negative fractions and decimals using area models and the number line, and connect each representation to the related equation.	This expectation addresses the conceptual meaning of multiplication and division of fractions and decimals. Students should be familiar with the use of visual representations like pictures (e.g., sketching the problem, grid paper) and physical objects (e.g., tangrams, cuisenaire rods). They should connect the visual representation to the corresponding equation. The procedures for multiplying fractions and decimals are addressed in 6.1.D and 6.1.E.

Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
6.1.C Estimate products and quotients of fractions and decimals.	Example: • $0.28 \div 0.96 \approx 0.3 \div 1;\ 0.3 \div 1 = 0.3$ $0.24 \times 12.4 \approx \frac{1}{4} \times 12.4;\ \frac{1}{4} \times 12.4 = 3.1$ $\frac{3}{13} \times \frac{20}{41} \approx \frac{1}{4} \times \frac{1}{2};\ \frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$
6.1.D Fluently and accurately multiply and divide non-negative fractions and explain the inverse relationship between multiplication and division with fractions.	Students should understand the inverse relationship between multiplication and division, developed in grade three and now extended to fractions. Students should work with different types of rational numbers, including whole numbers and mixed numbers, as they continue to expand their understanding of the set of rational numbers. Examples: • Multiply or divide. $\frac{4}{5} \times \frac{2}{3}$ $\quad 6 \div \frac{3}{8}$ $2\frac{1}{4} \times 3\frac{1}{2}$ $\quad 4\frac{1}{5} \div 1\frac{2}{3}$
6.1.E Multiply and divide whole numbers and decimals by 1000, 100, 10, 1, 0.1, 0.01, and 0.001.	This expectation extends what students know about the place value system and about multiplication and division and expands their set of mental math tools. As students work with multiplication by these powers of 10, they can gain an understanding of how numbers relate to each other based on their relative sizes. Example: • Mentally compute 0.01 x 435.
6.1.F Fluently and accurately multiply and divide non-negative decimals.	Students should understand the inverse relationship between multiplication and division, developed in grade three and now extended to decimals. Students should work with different types of decimals, including decimals greater than 1, decimals less than 1, and whole numbers, as they continue to expand their understanding of the set of rational numbers. Example: • Multiply or divide. 0.84×1.5 $\quad 2.04 \times 32$ $7.85 \div 0.32$ $\quad 17.28 \div 1.2$

Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
6.1.G Describe the effect of multiplying or dividing a number by one, by zero, by a number between zero and one, and by a number greater than one.	Examples: • Without doing any computation, list 74, 0.43×74, and $74 \div 0.85$ in increasing order and explain your reasoning. • Explain why $\frac{4}{0}$ is undefined.
6.1.H Solve single- and multi-step word problems involving operations with fractions and decimals and verify the solutions.	The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations. Example: • Every day has 24 hours. Ali sleeps 3/8 of the day. Dawson sleeps 1/3 of the day. Maddie sleeps 7.2 hours in a day. Who sleeps the longest? By how much?

Grade 6

6.2. Core Content: *Mathematical expressions and equations*

Performance Expectations	Explanatory Comments and Examples
Students are expected to:	
6.2.D Apply the commutative, associative, and distributive properties, and use the order of operations to evaluate mathematical expressions.	Examples: • Simplify $6\left(\frac{1}{2}+\frac{1}{3}\right)$, with and without the use of the distributive property. • Evaluate $b - 3(2a - 7)$ when $a = 5.4$ and $b = 31.7$.

Grade 6

6.3. Core Content: *Ratios, rates, and percents*

Performance Expectations	***Explanatory Comments and Examples***
Students are expected to:	
6.3.C Represent percents visually and numerically, and convert between the fractional, decimal, and percent representations of a number.	In addition to general translations among these representations, this expectation includes the quick recall of equivalent forms of common fractions (with denominators like 2, 3, 4, 5, 8, and 10), decimals, and percents. It also includes the understanding that a fraction represents division, an important conceptual background for writing fractions as decimals. Examples: • Represent $\frac{75}{100}$ as a percent using numbers, a picture, and a circle graph. • Represent 40% as a fraction and as a decimal. • Write $\frac{13}{16}$ as a decimal and as a percent.
6.3.D Solve single- and multi-step word problems involving ratios, rates, and percents, and verify the solutions.	The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations. Examples: • An item is advertised as being 25% off the regular price. If the sale price is $42, what was the original regular price? Verify your solution. • Sally had a business meeting in a city 100 miles away. In the morning, she drove an average speed of 60 miles per hour, but in the evening when she returned, she averaged only 40 miles per hour. How much longer did the evening trip take than the morning trip? Explain your reasoning.

Grade 6

6.5. Additional Key Content

Performance Expectations	***Explanatory Comments and Examples***
Students are expected to:	
6.5.A Use strategies for mental computations with non-negative whole numbers, fractions, and decimals.	Examples: • John wants to find the total number of hours he worked this week. Use his time card below to find the total. • What is the total cost for items priced at $25.99 and $32.95? (A student may think of something like 25.99 + 32.95 = (26 + 33) – 0.06 = 58.94.)

Days	Monday	Tuesday	Wednesday	Thursday	Friday
Days	$4\frac{1}{4}$	3	$6\frac{1}{2}$	$7\frac{1}{2}$	$1\frac{1}{2}$

Grade 7

7.1. Core Content: *Rational numbers and linear equations*

Performance Expectations	***Explanatory Comments and Examples***
Students are expected to:	
7.1.B Represent addition, subtraction, multiplication, and division of positive and negative integers visually and numerically.	Students should be familiar with the use of the number line and physical materials, such as colored chips, to represent computation with integers. They should connect numerical and physical representations to the computation. The procedures are addressed in 7.1.C. Examples: • Use a picture, words, or physical objects to illustrate 3 – 7; –3 – 7; –3 – (–7); (–3)(–7); 21 ÷ (–3). • At noon on a certain day, the temperature was 13°; at 10 p.m. the same day, the temperature was –8°. How many degrees did the temperature drop between noon and 10 p.m.? • At noon on a certain day, the temperature was 13°; at 10 p.m. the same day, the temperature was –8°. How many degrees did the temperature drop between noon and 10 p.m.?

Performance Expectations *Students are expected to:*	*Explanatory Comments and Examples*
7.1.C Fluently and accurately add, subtract, multiply, and divide rational numbers.	This expectation brings together what students know about the four operations with positive and negative numbers of all kinds—integers, fractions, and decimals. Some of these skills will have been recently learned and may need careful development and reinforcement. This is an opportunity to demonstrate connections among the operations and to show similarities and differences in the performance of these operations with different types of numbers. Visual representations may be helpful as students begin this work, and they may become less necessary as students become increasingly fluent with the operations. Examples: • $-\frac{4}{3} \cdot \frac{3}{4} =$ • $\frac{-272}{8} =$ • $(3.5)(-6.4) =$
7.1.G Solve single- and multi-step word problems involving rational numbers and verify the solutions.	The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations. Example: • Tom wants to buy some candy bars and magazines for a trip. He has decided to buy three times as many candy bars as magazines. Each candy bar costs \$0.70 and each magazine costs \$2.50. The sales tax rate on both types of items is $6\frac{1}{2}\%$. How many of each item can he buy if he has \$20.00 to spend?

Grade 7

7.2. Core Content: *Proportionality and similarity*

Performance Expectations	*Explanatory Comments and Examples*
Students are expected to:	
7.2.A Mentally add, subtract, multiply, and divide simple fractions, decimals, and percents.	Example: • A shirt is on sale for 20% off the original price of $15. Use mental math strategies to calculate the sale price of the shirt.

Grade 8

8.4. Additional Key Content

Performance Expectations	*Explanatory Comments and Examples*
Students are expected to:	
8.4.B Solve problems involving operations with numbers in scientific notation and verify solutions.	Units include those associated with technology, such as nanoseconds, gigahertz, kilobytes, teraflops, etc. Examples: • A supercomputer used by a government agency will be upgraded to perform 256 teraflops (that is, 256 trillion calculations per second). Before the upgrade, the supercomputer performs 1.6×10^{13} calculations per second. How many more calculations per second will the upgraded supercomputer be able to perform? Express the answer in scientific notation. • A nanosecond is one billionth of a second. How many nanoseconds are there in five minutes? Express the answer in scientific notation.
8.4.C Evaluate numerical expressions involving non-negative integer exponents using the laws of exponents and the order of operations.	Example: • Simplify and write the answer in exponential form: $\frac{(7^4)^2}{7^3}$ Some students will be ready to solve problems involving simple negative exponents and should be given the opportunity to do so. Example: • Simplify and write the answer in exponential form: $(5^4)^2 5^{-3}$

Washington State K-12 Mathematics Standards

April 2008

Computation in Grades K-7

	K	1	2	3	4	5	6	7
Whole Number Addition and Subtraction	C	C	P	P	M			
Whole Number Multiplication			C	C	P	M		
Whole Number Division			C	C	P	M		
Fraction and Decimal Addition and Subtraction						C	P	M
Fraction and Decimal: Multiplication and Division							C P	M
Integer Addition, Subtraction, Multiplication and Division								C P M
Positive and Negative Rational Numbers: All Operations								C P M

C Development of **Conceptual** understanding of addition, subtraction, multiplication and division

P Development of **Procedures** including fact fluency and algorithms

M Expectation of **Mastery** of concepts and procedures

Basic Facts

- ❑ Quick recall of addition and subtraction facts is developed at grade one and brought to mastery at grade two.
- ❑ Quick recall of multiplication and division facts is developed at grade three and brought to mastery at grade four.

Inclusion of Standard Whole Number Algorithms

	2	3	4	5	6
Whole Number Addition and Subtraction					
Whole Number Multiplication					
Whole Number Division					