Matanuska-Susitna Borough School District
Summary of Third Grade Math Standards

MAJOR, SUPPORTING, AND ADDITIONAL CLUSTERS FOR THIRD GRADE

All clusters are important and need to be taught for student success. The major clusters emphasize the depth of conceptual understanding and require more time for students to master the concepts. The supporting and additional clusters will help expand knowledge of the major clusters.

Key:	Major Clusters ■	Supporting Clusters □	Additional Clusters ○

3.OA.1-4	■	Represent and solve problems involving multiplication and division.
3.OA.5-6	■	Understand properties of multiplication and the relationship between multiplication and division.
3.OA.7	■	Multiply and divide up to 100.
3.OA.8-9	■	Solve problems involving the four operations, and identify and explain patterns in arithmetic.
3.NBT.1-3	○	Use place value understanding and properties of operations to perform multi-digit arithmetic.
3.NF.1-3	■	Develop understanding of fractions as numbers.
3.MD.1-3	■	Solve problems involving measurement and estimation of intervals of time, liquid volumes and masses of objects.
3.MD.4-6	□	Represent and interpret data.
3.MD.7-9	■	Geometric measurement: understand concepts of area and relate area to multiplication and to addition.
3.MD.10	○	Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.
3.G.1-2	□	Reason with shapes and their attributes.

Third Grade Focal Points

Highlights: Major Clusters

- Students continue to use the subdivision and recombining strategies to estimate the answers to addition and subtractions problems. Simultaneously, deriving multiplication answers from known facts.
- Multiplication is not just repeated addition but related to division and geometry.
- Fractions are not just part of a whole but show as a number and replace with value.
- Understand the relationship between numerator and denominator.
- Equal sign means equality not just an answer to math problems.

Fluency

Fluency means accuracy (attending to precision), efficiency (using well-understood strategies with ease), and flexibility (using strategies such as making 10 or breaking apart numbers).

3.OA.C.7 Single-digit products and quotients (products from memory by the end of Grade 3), mastery of multiplication to 100
3.NBT.2 Add/subtract within 1000

3.OA.2. Interpret whole-number quotients of whole numbers (e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned. into equal shares of 8 objects each). *For example: Deconstruct rectangular arrays or describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.*	Recognize the operation of division by: • Determining the number of equal groups. • Determining how many in each group. • Model division by deconstructing rectangular arrays into equal groups. • Interpret a problem situation requiring division using pictures, objects, words, numbers, and equations.	• Activate prior knowledge: arrays demonstrate successive subtraction. • When the Doorbell Rang This book illustrates "How many in each group." Opportunity for students to role play while learning the objective.

Standard	Objective
3.OA.3. Use multiplication and division numbers up to 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).	• Apply the skills of multiplication or division to solve one step word problems. • Write an equation for a word problem, using a symbol for the unknown factor. • Solve using a variety of representations and equations. • Explain thinking (show work) • Verify that answer is reasonable

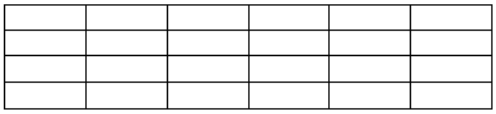
Examples

This standard reference various strategies that can be used to solve word problems involving multiplication & division. Students should apply their skills to solve word problems. Students should use a variety of representations for creating and solving one-step word problems, such as: If you divide 4 packs of 9 brownies among 6 people, how many cookies does each person receive? *(4 x 9 = 36, 36 ÷ 6 = 6).* Glossary page 89, Table 2 (table also included at the end of this document for your convenience) gives examples of a variety of problem solving contexts, in which students need to find the product, the group size, or the number of groups. Students should be given ample experiences to explore all of the different problem structures.

Examples of multiplication:

There are 24 desks in the classroom. If the teacher puts 6 desks in each row, how many rows are there? This task can be solved by drawing an array by putting 6 desks in each row.

This is an array model:



This task can also be solved by drawing pictures of equal groups.

4 groups of 6 equals 24 objects

A student could also reason through the problem mentally or verbally, "I know 6 and 6 are 12. 12 and 12 are 24. Therefore, there are 4 groups of 6 giving a total of 24 desks in the classroom."

A number line could also be used to show equal jumps.

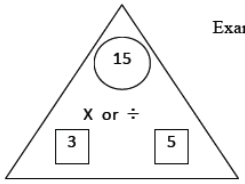
Students in third grade students should use a variety of pictures, such as stars, boxes, flowers to represent unknown numbers (variables). Letters are also introduced to represent unknowns in third grade.

Examples of Division:

There are some students at recess. The teacher divides the class into 4 lines with 6 students in each line. Write a division equation for this story and determine how many students are in the class *(□ ÷ 4 = 6. There are 24 students in the class).*

Standard	Objective	Examples
3.OA.4. Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 x ? = 48, 5 = ? ÷ 3, 6 x 6 = ?*	• Explore the inverse operation of multiplication and division. • Identify unknown product, group size or number of groups. • Apply their understanding of the meaning of the equal sign as "the same as" to interpret an equation with an unknown.	• UNKNOWN: Product (3x6=? Or 18÷3=6) Group Size (3x?=18 or 18÷3=6) Number of Groups ((?x6=18 or 18÷6=3) • Introduce using fact families

3.OA.5-6 Understand properties of multiplication and the relationship between multiplication and division

Standard	Objective	Examples
3.OA.5. Make, test, support, draw conclusions and justify conjectures about properties of operations as strategies to multiply and divide. (Students need not use formal terms for these properties.) • Commutative property of multiplication: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. • Associative property of multiplication: 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. • Distributive property: Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. • Inverse property (relationship) of multiplication and division.	• Understand that properties are rules about how numbers work. • Represent equations using various objects, pictures, words and symbols in order to develop their understanding of properties.	• Changing the order of numbers to determine that the order of numbers does not make a difference in multiplication, but it DOES make a difference in division. • Splitting arrays helps in understanding the distributive property. • Models help develop understanding of the Commutative Property. • Distributive Property/breaking numbers apart: 7x6 7x6 7x5=35 7x3=21 7x1=7 7x3=21 35+7=42 21+21=42
3.OA.6. Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*	• Understand division as an unknown-factor problem.	Fact family triangles demonstrate the inverse operations of multiplication and division.  Examples: • 3 x 5 = 15 5 x 3 = 15 • 15 ÷ 3 = 5 15 ÷ 5 = 3

3.OA.7 Multiply and divide up to 100

Standard	Objective	Examples
3.OA.7. Fluently multiply and divide numbers up to 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 ×5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	• Build a foundation for multiplication and division fact fluency with accuracy and efficiency. • Demonstrate knowledge of fluency procedures and explain when and how to use them.	This standard uses the word fluently, which means *accuracy, efficiency* (**using a reasonable amount of steps and time),** and flexibility (using strategies such as the distributive property). "Know from memory" does **not** mean focusing only on timed tests and repetitive practice, but ample experiences working with manipulatives, pictures, arrays, word problems, numbers (etc.) to internalize basic facts up to 9x9.

3.OA.8-9 Solve problems involving the four operations, and identify and explain patterns in arithmetic

Standard	Objective	Examples
3.OA.8. Solve and create two-step word problems using any of the four operations. Represent these problems using equations with a symbol (box, circle, question mark) standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	• Analyze the structure of the problem before attempting to solve. • Use and discuss various strategies for solving word problems. • Estimation should be used during problem solving, then revisited to check for reasonableness. • Represent problems using equations with a symbol to represent unknown quantities. • Justify conclusions with mathematical ideas.	• Kelly runs 3 miles a day. Her goal is to run 24 miles. After 5 days, how many miles does Kelly have left to run in order to meet her goal? Write an equation and find a solution. (3 x 5 + ? = 24) • Students could critique each other's work. • On a vacation, your family travels 267 miles on the first day, 194 miles on the second day and 34 miles on the third day. How many total miles did they travel? Use estimation strategies. Student 1: I first thought about 267 and 34. I noticed that their sum is about 300. Then I knew that 194 is close to 200. When I put 300 and 200 together, I get 500. Student 2: I first thought about 194. It is really close to 200. I also have 2 hundreds in 267. That gives me a total of 4 hundreds. Then I have 67 in 267 and the 34. When I put 67 and 34 together that is really close to 100. When I add that hundred to the 4 hundreds that I already had, I end up with 500. Student 3: I rounded 267 to 300. I rounded 194 to 200. I rounded 34 to 30. When I added 300, 200 and 30, I know my answer will be about 530.

Standard	Objective
3.OA.9. Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations. *For example: Observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*	• Observe and identify important numerical patterns related operations. • Investigate addition and multiplication tables in search of patterns. • Explain why patterns make sense mathematically.

Examples

- Build upon previous experiences with properties related to addition and subtraction.

x	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

PROPERTIES OF OPERATIONS PATTERNS

- Even numbers always divisible by 2.
- Even numbers can always be decomposed into 2 equal addends (14=7+7).
- Multiples of even numbers are always even numbers.
- The sums in each column and row on 100's chart increase by the same amount.
- The products in each row and column increase by the same amount (skip counting)
- What do you notice about the numbers highlighted in pink in the multiplication table? Explain a pattern using properties of operations. *When (commutative property) one changes the order of the factors they will still get the same product: 6x5=30 and 5x6=30.*

Teacher: What pattern do you notice when 2, 4, 6, 8, or 10 are multiplied by any number (even or odd)?
Student: The product will always be an even number.
Teacher: Why?

x	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

- What patterns do you notice in this addition table? Explain why the pattern works this way.

+	0	1	2	3	4	5	6	7	8	9	10
0	0	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10	11
2	2	3	4	5	6	7	8	9	10	11	12
3	3	4	5	6	7	8	9	10	11	12	13
4	4	5	6	7	8	9	10	11	12	13	14
5	5	6	7	8	9	10	11	12	13	14	15
6	6	7	8	9	10	11	12	13	14	15	16
7	7	8	9	10	11	12	13	14	15	16	17
8	8	9	10	11	12	13	14	15	16	17	18
9	9	10	11	12	13	14	15	16	17	18	19
10	19	11	12	13	14	15	16	17	18	19	20

- Students need ample opportunities to observe and identify important numerical patterns related to operations. They should build on their previous experiences with properties related to addition and subtraction. Students investigate addition and multiplication tables in search of patterns and explain why these patterns make sense mathematically.

Example:

addend	addend	sum
0	20	20
1	19	20
2	18	20
3	17	20
4	16	20
□	□	□
□	□	□
□	□	□
20	0	20

- Any sum of two even numbers is even.
- Any sum of two odd numbers is even.
- Any sum of an even number and an odd number is odd.
- The multiples of 4, 6, 8, and 10 are all even because they can all be decomposed into two equal groups.
- The doubles (2 addends the same) in an addition table fall on a diagonal while the doubles (multiples of 2) in a multiplication table fall on horizontal and vertical lines.
- The multiples of any number fall on a horizontal and a vertical line due to the commutative property.
- All the multiples of 5 end in a 0 or 5 while all the multiples of 10 end with 0. Every other multiple of 5 is a multiple of 10.
- Students also investigate a hundred chart in search of addition and subtraction patterns. They record and organize all the different possible sums of a number and explain why the pattern makes sense.

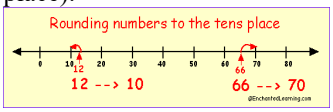
Numbers and Operations in Base Ten

3.NBT.1-3 Use place value understanding and properties of operations to perform multi-digit arithmetic

Standard	Objective
3.NBT.1. Use place value understanding to round whole numbers to the nearest 10 or 100.	• Demonstrate a strong understanding of place value • Learn when and why to round numbers. • Identify possible answers and halfway points. • Identify where a given number falls between possible answers and halfway points. • Understand that if a number is exactly at the halfway point of the two possible answers, the number is rounded up.

Examples

When a number is rounded (or rounded off), it is approximated by eliminating the least significant digits. When rounding, find the closest multiple of ten (or one hundred, or other place value) to your number. For example, the number 42 can be rounded down to 40 (this number was rounded to the tens place). Similarly, 285 can be rounded up to 300 (this number was rounded to the hundreds place).



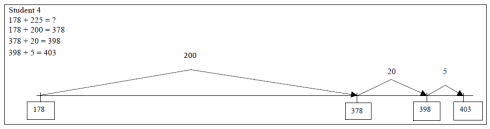
Enchanted Learning

Standard	Objective
3.NBT.2. Use strategies and/or algorithms to fluently add and subtract with numbers up to 1000, demonstrating an understanding of place value, properties of operations, and/or the relationship between addition and subtraction.	• Solve problems using both vertical and horizontal forms. • Applies a variety of strategies including commutative and associative properties, as well as traditional algorithms to solve problems. • Verbalize methods and show work used for solving problems. • Check work for accuracy to verify reasonableness of answers.

Examples

There are 178 fourth graders and 225 third graders on the playground. What is the total number of students on the playground?

Student 1	Student 2	Student 3
100 + 200 = 300 70 + 20 = 90 8 + 5 = 13 300 + 90 + 13 = 403 students	I added 2 to 178 to get 180. I added 220 to get 400. I added the 3 left over to get 403.	I know the 75 plus 25 equals 100. I then added 1 hundred from 178 and 2 hundreds from 275. I had a total of 4 hundreds and I had 3 more left to add. So I have 4 hundreds plus 3 more which is 403.



Standard	Objective
3.NBT.3. Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 x 80, 10 x 60) using strategies based on place value and properties of operations.	• Apply knowledge of place value. • Explain and reason about their products. • Use base ten tools, diagrams, hundreds of charts to understand the meanings of the multiples of 10. • Recognize patterns in multiplying by multiples of 10.

Examples

*For the problem 50 x 4, students should think of this as 4 groups of 5 tens or 20 tens. Twenty tens equal 200.
*30 is 3 Tens and 70 is 7 tens.
*Use manipulative, drawings, document camera, and/or white board to demonstrate understanding.