Elementary Mathematics Curriculum

Curriculum & Instruction

Adopted by Board of Education June 10, 2008
District A - President
Helayne Jones, Ed.D.
helayne.jones@bvsd.org
voice-mail: 303.245.5815
fax: 303.545.6477

District B - Vice President
Lesley Smith, Ph.D.
lesley.smith@bvsd.org
voice-mail: 303.245.5814

District C
Laurie Albright, Ed.D.
laurie.albright@bvsd.org
voice-mail: 303.245.5817

District D - Treasurer
Ken Roberge
ken.roberge@bvsd.org
voice-mail: 303.245.5813

District E
Patti J. Smith
patti.smith@bvsd.org
voice-mail: 303.245.5816

District F
Jean Paxton
jean.paxton@bvsd.org
voice-mail: 303.245.5818
fax: 303.438.8572

District G
Jim Reed
jim.reed@bvsd.org
voice-mail: 303.245.5819

BVSD Superintendent
Christopher King, Ph.D.
superintendent@bvsd.org
phone: 303.447.5114
fax: 303.447.5134
The content of the Elementary Math Curriculum aligns with the Boulder Valley School District Math Content Standards and Benchmarks. It reflects the priorities of the state assessment framework and focuses on identified essential learning results. The district curriculum will not always incorporate all benchmarks and topics of the standards, but will focus on those that are deemed most essential during the curriculum review process.
2007-2008 Mathematics Curriculum Writing Team

Jim Armitage
Patti Bleil
Taren Bowman
Jeanne Candler
Carrie Cantrell
Jessica Evans
Dara Glazer
Michele Hibl
Jody Hostetter
Kartal Jaquette
Linda Knappenberger
Nancy Lind
Lisa Mesple
Kim Moroze
Kitty Mulkey
Carolyn Mundt
Kris Nadeau
Miki Novaria
Sue Parsons
Mary Pittman
Diane Richey
Anne Schwarz
Isabelle Smith
Sheri Smith
Joan Standefer
Mary Stokes
Lynn Twietmeyer
Karen Weaver
Vanessa West
David Woodward

Ryan Elementary
Community Montessori
Aspen Creek K-8
Douglass Elementary
Superior Elementary
Learning Services
Learning Services
Coal Creek
Emerald Elementary
Eisenhower Elementary
Monarch K-8
Birch Elementary
Learning Services
Ed Center
Ed Center
Ryan Elementary
Eldorado K-8
Emerald Elementary
Columbine Elementary
Learning Services
Heatherwood Elementary
Learning Services
Pioneer Elementary
Emerald Elementary
Heatherwood Elementary
Heatherwood Elementary
Douglass Elementary
Ed Center
Sanchez Elementary
Learning Services
## Glossary of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Curriculum Framework</strong></td>
<td>The Curriculum Framework provides a blueprint for teachers to use in the planning and delivery of instruction and in the assessment of and for student learning. The Curriculum Framework includes standards, essential learning results, topics, skills and concepts, performance indicators, and assessments.</td>
</tr>
<tr>
<td><strong>Essential Learning Results</strong></td>
<td>Essential Learning Results (ELRs) are the backbone of a guaranteed viable curriculum. ELRs are aligned with standards and articulate the skills, content, and concepts determined to be nonnegotiable areas for proficiency attainment by all students so that they are prepared for the next year/level of education. The Essential Learning Results are the mandated curriculum of BVSD and form the basis upon which common assessments are created.</td>
</tr>
<tr>
<td><strong>Instructional Strategies</strong></td>
<td>These articulate the classroom strategies that have a research or theoretical base for improving the level of student achievement.</td>
</tr>
<tr>
<td><strong>Performance Indicators</strong></td>
<td>Performance Indicators clarify the ELRs, describe the indicators of achievement, and inform the selection of appropriate formative and summative assessments.</td>
</tr>
<tr>
<td><strong>Content Standards</strong></td>
<td>Content Standards are broad statements of what students will be able to know, do, and understand as a result of comprehensive study in grades K-12. <em>The Boulder Valley School District Content Standards for Mathematics</em> are based on the <em>Colorado Model Mathematics Standards</em>.</td>
</tr>
<tr>
<td><strong>Course Beliefs</strong></td>
<td>Course Beliefs indicate why it is important for students to study mathematics.</td>
</tr>
<tr>
<td><strong>Course Description</strong></td>
<td>Course Description provides a brief overview of the course.</td>
</tr>
<tr>
<td><strong>Course Outline</strong></td>
<td>The Course Outline is a one page graphic organizer that illustrates at the macrolevel the components of a year long course. It includes course description, course beliefs, evidence-based instructional strategies, and key concepts. Teachers should post or distribute copies of the appropriate course outline to their students.</td>
</tr>
<tr>
<td><strong>Key Concepts</strong></td>
<td>Key Concepts are the concepts within each content standard discussed at each grade level.</td>
</tr>
</tbody>
</table>
A rigorous and challenging standards-based instructional program ensures maximum academic achievement for all students. The Boulder Valley School District Instructional Framework is a graphic representation that demonstrates how all of the components of an instructional program fit together. Teachers should use this framework and its questions to guide instructional planning and decision-making.

- **Assessment**: How will we know if all students have learned? Are there multiple ways students can demonstrate learning?
- **Intervention & Extension**: How will we respond when students have not learned? How will we extend learning experiences for students who have learned?
- **Vision**: We will create and sustain a network of high achieving schools where patterns of achievement are not predicted by race, ethnicity, gender, poverty, ability, language or sexual orientation.
- **Guaranteed Viable Curriculum**: What do we expect all students to know, do, and understand? Do all students have access to the general education curriculum?
- **High Quality Classroom Instruction**: What instructional experiences will we provide? What accommodations are in place to support all learners?
- **Reporting**: How will we report progress to students and parents? How will we ensure all parents and students have access to information about progress?
How Content and Curriculum Fit Together

Content Standards

K-4 Benchmarks

Grade/Course Level Curriculum
Essential Learning Results
• Key Concepts, Structures & Topics
• Big Ideas
• Essential Questions

Performance Indicators
• Knowledge & Skills
• Assessment

5-8 Benchmarks

Grade/Course Level Curriculum
Essential Learning Results
• Key Concepts, Structures & Topics
• Big Ideas
• Essential Questions

Performance Indicators
• Knowledge & Skills
• Assessment

9-12 Benchmarks

Grade/Course Level Curriculum
Essential Learning Results
• Key Concepts, Structures & Topics
• Big Ideas
• Essential Questions

Performance Indicators
• Knowledge & Skills
• Assessment
A guaranteed and viable curriculum is a necessity for creating a program of mathematics that provides a common foundation of challenging mathematics for all students. In 2006 a process of revision began on the mathematics curriculum of the Boulder Valley School District to ensure a strong common mathematical foundation. This revision was inspired by the Curriculum Focal Points released in 2006 by the National Council of Teachers of Mathematics as an addendum to their Principles and Standards (2000) document.

The Focal Points document identified key mathematical topics for each grade level, which provide the foundation for understanding and continued learning. Each focal point includes concepts, skills, and procedures focused on a relatively few but highly important topics. The goal of the focal points is to suggest to school districts a way to move from the mile wide inch deep curriculums of the past to a stronger deeper mathematical experience. By focusing on fewer topics students are provided with extended experiences designed to build deep understanding, fluency with skills, and the ability to generalize and transfer knowledge to future learning.

The National Council of Teachers of Mathematics Principles and Standards (2000) states that “Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students’ learning” (p. 24). The use of technology in BVSD mathematics classrooms is chosen carefully and integrated consistently throughout the curriculum in order to enhance learning and support effective teaching. Technology is not a replacement for understanding of key ideas and skills, however it can and should be used to expand the topics that are accessible to all students at each grade level. The use of technology provides opportunities for students to focus on mathematical concepts, create conjectures, generalize their thinking, and create justifications. Technology has the potential for extending the boundaries of the classroom and providing students with opportunities for increased practice and access to novel problems deemed inaccessible prior to technology.
Mathematical Process Standards

The Process Standards of the National Council of Teachers of Mathematics are a key component to the BVSD mathematics curriculum. They indicate the ways in which students should acquire and use their content knowledge. The five process standards in mathematics are problem solving, reasoning, communication, connections, and representations. These processes are an integral part of all mathematics learning and teaching. A mathematical learning experience focused on the five process standards prepares students with the processes necessary for continued learning in future mathematical courses and careers. Therefore every process standard should be an integral part of the learning and assessment of every essential learning result and performance indicator.

Communication

- Organize and consolidate their mathematical thinking through communication
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others
- Analyze and evaluate the mathematical thinking and strategies of others
- Use the language of mathematics to express mathematical ideas precisely

Representations

- Create and use representations to organize, record, and communicate mathematical ideas
- Select, apply, and translate among mathematical representations to solve problems
- Use representations to model and interpret physical, social, and mathematical phenomena

Reasoning

- Recognize reasoning and proof and fundamental aspects of math
- Make and investigate mathematical conjectures
- Develop and evaluate mathematical arguments
- Select and use various types of reasoning and methods of proof

Connections

- Recognize and use connections among mathematical ideas
- Understand how mathematical ideas interconnect and build on one another to produce a coherent whole
- Recognize and apply mathematics in contexts outside of mathematics

Problem Solving

- Build new mathematical knowledge through problem solving
- Solve problems that arise in mathematics and in other contexts
- Apply and adapt a variety of appropriate strategies to solve problems
- Monitor and reflect on the process of mathematical problem solving

Standard 1: Students develop number sense and use number relationships to solve problems. They communicate their reasoning used to solve these problems.

Standard 2: Students use algebraic methods to solve problems by exploring, modeling, and describing patterns and relations involving numbers, shapes, data, and graphs. They communicate their reasoning used to solve these problems.

Standard 3: Students use data collection and analysis, statistics, and probability to solve problems. They communicate their reasoning used to solve these problems and accurately display the data in a way that conclusions can be drawn.

Standard 4: Students use geometric concepts, properties, and relationships in one, two, and three dimensions to model and solve problems. They communicate their reasoning used to solve these problems.

Standard 5: Students use a variety of measurement tools, techniques, and systems to solve problems. They communicate their reasoning used to solve these problems.

Standard 6: Students make connections between concepts and procedures to effectively use computational skills to solve problems. They use appropriate techniques for the problem or situation (for example: estimation, mental math, paper and pencil, calculators, computers). They communicate their reasoning used to solve these problems.
Elementary Math
Pre-Kindergarten
Essential Learning Results
Pre-Kindergarten

**Number and Operations:** Students develop an understanding of numbers in verbal, symbolic, and quantitative forms for whole numbers up to 10.

In order to meet this result, a pre-kindergarten student:

- √ says the forward number word sequence to 10 with fluency
- √ matches spoken number words to quantities to 10
- √ uses one-to-one correspondence when counting objects, sounds, and movement to 10
- √ counts and uses the last number stated to tell “how many” in a set of objects to 10
- √ compares, matches and orders sets of objects by quantity using language such as “more than,” “less than,” and “the same”
- √ recognizes the number of objects in groups to 5 without counting and verifies by counting

**Geometry and Measurement:** Students interpret and describe the physical world with geometric ideas.

In order to meet this result, a pre-kindergarten student:

- √ finds shapes in the environment and describes them in their own words
- √ builds designs by combining shapes and solids
- √ solves problems by deciding which shape will fit into a space in a puzzle
- √ describes relative positions of objects with vocabulary such as “above,” “below,” “before,” “after,” and “next to”
- √ identifies objects as “same” or “different,” and then “more” or “less” based on measurable attributes
- √ identifies measurable attributes such as length and weight and solves problems by making direct comparisons of objects based on those attributes

**Connections**

**Data Connection:**
- sorts geometric figures by attributes such as shape, color, number of sides or vertices, and size
- sorts objects into categories and compares by measurable attributes (heavier, lighter, longer, shorter)

**Algebra Connection:**
- recognizes and duplicates simple sequential patterns
Beliefs about Math:
Learning with understanding is essential to mathematical literacy. Mathematical literacy means having procedural and computational skills as well as conceptual understanding. The strands of mathematical proficiency are represented by the acronym UCARE...

Understand (Conceptual)
Computing (Procedural Fluency)
Applying (Strategic Competence)
Reasoning (Adaptive Reasoning)
Engaging (Productive Disposition)

Instructional Strategies:
• Maintaining an inquiry-based learning environment
• Facilitating interactive and thoughtful student discussions about mathematical concepts and processes
• Maintaining a high level of student engagement
• Helping students make connections to prior knowledge
• Using a variety of strategies to check for student understanding
• Using assessment to guide instruction
• Differentiating instruction to meet student needs

Mathematics at the Pre-Kindergarten level is designed to provide a common foundation of challenging mathematics for all students. Pre-Kindergarten grade mathematics has two focal points: 1) number and operations and 2) geometry and measurement. Algebraic thinking and data analysis and probability are connections that weave throughout these focal points. Students develop understanding in each focal point and connection through experiences that emphasize problem solving, communication, representations, connections and reasoning and proof.

Number
Cardinality
Comparison
One-to-One Correspondence
Quick Images
Number Words to 10

Key Concepts

Geometry and Measurement
Find and Describe Shapes
Identify and Compare Shapes
Combine Shapes
Relative Position
Repeating Patterns
Algebra Connection
Sorting
Data Connection
### Essential Learning Results and Performance Indicators

#### Number and Operations
Colorado State Standards 1 and 6

<table>
<thead>
<tr>
<th>Essential Learning Result</th>
<th>Performance Indicators</th>
<th>Creative Curriculum Objective Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>PK.1</td>
<td>Develop an understanding of whole numbers, including concepts of one-to-one correspondence, counting, and comparison. In order to meet this result, a student:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Says the forward number word sequence to 10 with fluency</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>b. Matches spoken number words to quantities to 10</td>
<td>33, 34</td>
</tr>
<tr>
<td></td>
<td>c. Uses one-to-one correspondence when counting objects, sounds, and movements to 10</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>d. Counts and uses the last number stated to tell “how many” in a set of objects (i.e., cardinality) to 10</td>
<td>33, 34</td>
</tr>
<tr>
<td></td>
<td>e. Compares, matches, and orders sets of objects by quantity using language such as “more than,” “less than,” and “the same”</td>
<td>28, 34</td>
</tr>
<tr>
<td></td>
<td>f. Recognizes the number of objects in groups to 5 without counting and verifies by counting</td>
<td>33, 34</td>
</tr>
</tbody>
</table>

**Key academic vocabulary:** different, less than, more than, number words to 10, same
## Essential Learning Results and Performance Indicators (cont.)

### Geometry and Measurement
Colorado State Standards 4 and 5

<table>
<thead>
<tr>
<th>Essential Learning Result PK.2</th>
<th>Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify shapes and measurable attributes and compare objects using these attributes. In order to meet this result, a student:</td>
<td>a. Finds shapes in the environment and describes them in their own words</td>
</tr>
<tr>
<td></td>
<td><strong>Data Connection:</strong> Sorts geometric figures by attributes such as shape, color, number of sides or vertices, and size</td>
</tr>
<tr>
<td></td>
<td>b. Builds designs by combining shapes and solids</td>
</tr>
<tr>
<td></td>
<td><strong>Algebra Connection:</strong> Recognizes and duplicates simple sequential patterns</td>
</tr>
<tr>
<td></td>
<td>c. Solves problems by deciding which shape will fit into a space in a puzzle</td>
</tr>
<tr>
<td></td>
<td>d. Describes relative position of objects with vocabulary such as “above,” “below,” “before,” “after,” and “next to”</td>
</tr>
<tr>
<td></td>
<td>e. Identifies objects as “same” or “different,” and then “more” or “less” based on measurable attributes</td>
</tr>
<tr>
<td></td>
<td>f. Identifies measurable attributes such as length and weight and solves problems by making direct comparisons of objects based on those attributes</td>
</tr>
<tr>
<td></td>
<td><strong>Data Connection:</strong> Sorts objects into categories and compares by measurable attributes (heavier, lighter, longer, shorter)</td>
</tr>
<tr>
<td></td>
<td>Creative Curriculum Objective Numbers</td>
</tr>
<tr>
<td></td>
<td>27, 28, 29</td>
</tr>
<tr>
<td></td>
<td>27, 28, 29, 30</td>
</tr>
<tr>
<td></td>
<td>27, 28, 29</td>
</tr>
<tr>
<td></td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>27, 28</td>
</tr>
<tr>
<td></td>
<td>27, 28, 29</td>
</tr>
</tbody>
</table>

**Key academic vocabulary:** above, after, before, below, different, heavier, in, less, lighter, longer, more, next to, on, same, shapes, shorter, solids, sort
Elementary Math
Kindergarten
Essential Learning Results
Kindergarten

**Number and Operations:** Students develop an understanding of numbers in verbal, symbolic, and quantitative forms for whole numbers up to 20.

In order to meet this result, a kindergarten student:

- √ identifies, sequences, and writes numerals 0-20
- √ says the number word sentence: forward to 20 and backward from 10 starting at any number in the sequence
- √ says the number directly before and after a given number in the range 1-10
- √ creates and counts collections of objects up to 20 and uses the last number stated to tell “how many” in a set of objects (cardinality)
- √ uses quantity to describe and compare sets of objects
- √ subitizes quantities and knows combinations to 5 in the context of materials
- √ combines and separates objects to form sets of up to 10 items

**Geometry and Measurement:** Students interpret and describe the physical world with geometric ideas.

In order to meet this result, a kindergarten student:

- √ identifies and describes a circle, oval, triangle, and rectangle (including squares) in a variety of orientations
- √ recognizes a rhombus, (regular) hexagon, and (isosceles) trapezoid
- √ uses combinations of basic shapes to represent objects in the environment
- √ describes, duplicates, creates, and extends simple repeating geometric patterns with up to 3 elements
- √ sorts a variety of two and three dimensional shapes using one attribute
- √ describes relative location of objects in the environment and in pictures

**Geometry and Measurement:** Students measure and compare objects with non-standard units.

In order to meet this result, a kindergarten student:

- √ estimates measurable attributes using non-standard units
- √ measures length, capacity, and weight using non-standard units and tools
- √ compares objects using measurable attributes
- √ knows the sequence and number of days in a week

**Connections**

**Algebra Connection:**
- √ Demonstrates that the order in which objects are counted does not matter
- √ Demonstrates that when sets of objects are combined, a larger set results, and when partitioned, smaller sets are formed.

**Number (Money) Connection:**
- √ Counts collections of pennies
- √ Recognizes, identifies and sorts pennies, nickels, dimes, quarters

**Data Analysis Connection:**
- √ Collects data and uses counting and comparing to answer questions
Beliefs about Math:
Learning with understanding is essential to mathematical literacy. Mathematical literacy means having procedural and computational skills as well as conceptual understanding. The strands of mathematical proficiency are represented by the acronym UCARE...

Understand (Conceptual)
Computing (Procedural Fluency)
Applying (Strategic Competence)
Reasoning (Adaptive Reasoning)
Engaging (Productive Disposition)

Instructional Strategies:
- Provides at least 25 minutes of math instruction per day
- Maintaining an inquiry-based learning environment
- Facilitating interactive and thoughtful student discussions about mathematical concepts and processes
- Maintaining a high level of student engagement
- Helping students make connections to prior knowledge
- Using a variety of strategies to check for student understanding
- Using assessment to guide instruction
- Differentiating instruction to meet student needs

Mathematics at the Kindergarten level is designed to provide a common foundation of challenging mathematics for all students. Kindergarten mathematics has two focal points: 1) number and operations and 2) geometry and measurement. Algebraic thinking, data analysis, and probability are connections that weave throughout these focal points. Students develop understanding in each focal point and connection through experiences that emphasize problem solving, communication, representations, connections, and reasoning and proof.

Number

- Numbers to 20
- Combinations to 5
- Combine and Separate Situations

Key Concepts

Geometry and Measurement

- Days of the Week
- Sorting
- Relative Location
- Basic Shapes
- Non-Standard Measurement
- Repeating Patterns (Algebra Connection)
### Essential Learning Results and Performance Indicators

**Number and Operation**

Colorado State Standards 1 and 6

<table>
<thead>
<tr>
<th>Essential Learning Result K.1</th>
<th>Develop an understanding of number in verbal, symbolic, and quantitative forms for whole numbers up to 20. In order to meet this result, a student:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Identifies, sequences, and writes numerals 0-20</td>
</tr>
<tr>
<td>b.</td>
<td>Says the number word sequence: forward to 20 and backward from 10 starting at any number in the sequence (e.g., “Start counting up from 8.”)</td>
</tr>
<tr>
<td>c.</td>
<td>Says the number directly before and after a given number in the range 1-10</td>
</tr>
</tbody>
</table>
| d.                           | Creates and counts collections of objects up to 20 and uses the last number stated to tell “how many” in a set of objects (cardinality)  
*Algebra Connection:* Demonstrate that the order in which objects are counted does not matter  
*Number (Money) Connection:* Counts collections of pennies |
| e.                           | Uses quantity to describe and compare sets of objects  
*Algebra Connection:* Demonstrate that the order in which objects are counted does not matter  
*Data Analysis Connection:* Collects data and uses counting and comparing to answer questions (“How many kids are having hot lunch today?”) |
| f.                           | Subitize quantities (e.g., regular dice patterns) and knows combinations to 5 in the context of materials (e.g., fingers) |
| g.                           | Combines and separates objects to form sets of up to 10 items  
*Algebra Connection:* Demonstrates that when sets of objects are combined, a larger set results, and when partitioned, smaller sets are formed |

**Key academic vocabulary:** add, after, before, combine, count, different, less than, more than, number words 0-20, order, separate, take away
### Geometry and Measurement
Colorado State Standards 4 and 5

<table>
<thead>
<tr>
<th>Essential Learning Results K.2</th>
<th>Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interpret and describe the physical world with geometric ideas. In order to meet this result, a student:</td>
<td></td>
</tr>
<tr>
<td>a. Identifies and describes a circle, oval, triangle, and rectangle (including squares) in a variety of orientations</td>
<td></td>
</tr>
<tr>
<td>b. Recognizes a rhombus, (regular) hexagon, and (isosceles) trapezoid</td>
<td></td>
</tr>
<tr>
<td>c. Uses combinations of basic shapes to represent objects in the environment (e.g., an ice cream cone may be represented by a triangle and circle)</td>
<td></td>
</tr>
<tr>
<td>d. Describes, duplicates, creates, and extends simple repeating geometric patterns with up to 3 elements</td>
<td></td>
</tr>
<tr>
<td>e. Sorts a variety of two and three dimensional shapes using one attribute, <strong>Number (Money) Connection:</strong> Recognizes, identifies, and sorts pennies, nickels, dimes, and quarters</td>
<td></td>
</tr>
<tr>
<td>f. Describes relative location of objects in the environment and in pictures</td>
<td></td>
</tr>
</tbody>
</table>
**Essential Learning Results**

**and**

**Performance Indicators (cont.)**

<table>
<thead>
<tr>
<th>Essential Learning Result K.3</th>
<th>Measure and compare objects with non-standard units. In order to meet this result, a student:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. Estimates measurable attributes (i.e., length, weight, and capacity) using non-standard units (e.g., “About how many paper clips long is this book?”)</td>
</tr>
<tr>
<td></td>
<td>b. Measures length, capacity, and weight using non-standard units and tools</td>
</tr>
<tr>
<td></td>
<td>c. Compares objects using measurable attributes (i.e., length, weight, capacity)</td>
</tr>
<tr>
<td></td>
<td>d. Knows the sequence and number of days in a week</td>
</tr>
</tbody>
</table>

**Key academic vocabulary:** above, after, before, below, circle, days of the week, heavier, hexagon, in, length, lighter, longer, names of coins, next to, on, order, oval, pattern, rectangle, rhombus, same, shapes, shorter, solids, square, sort, trapezoid, triangle, weight
Elementary Math
Grade One
**Essential Learning Results**

**Grade One**

**Number and Operations:** Students develop an understanding of numbers in verbal, symbolic, and quantitative forms for whole numbers up to 100.

In order to meet this result, a grade one student:

- Identifies, sequences, and writes numerals to 100
- Says the number word sequence: forward to 100, and backward from 30 starting at any number in the sequence
- Says the number directly before and after a given number in the same range
- Uses and understands the ordinal sequence to describe relative position in time and space
- Counts by tens forward and backward on decade
- Represents two-digit numbers with materials grouped in tens and ones, with emphasis on the teen numbers as being made up of one ten and ones
- Counts collections larger than 20 with efficient strategies (e.g., counting by multiples of 2s, 5s, and 10s)
- Puts objects in a collection into equal groups and uses the group structure to help keep track of the number of objects

**Number and Operations:** Students develop strategies to solve basic addition and subtraction problems.

In order to meet this result, a grade one student:

- Uses a variety of representations to model join, part-part-whole, separate, and compare situations to demonstrate the meanings of addition and subtraction problems and solve them
- Models the inverse relationship of addition and subtraction and uses that relationship to solve problems
- Uses counting on or counting back to solve addition and subtraction problems when one addend or the subtrahend is 6 or less
- Adds or subtracts groups of 10 to or from any number in the range of 1 to 100 with materials
- Uses the commutative property to add whole numbers
- Makes conjectures about number relationships and properties in addition and subtraction situations
- Uses materials to develop strategies to solve addition and subtraction problems under 20
- Combines and partitions numbers from 0-20

**Geometry and Measurement:** Students identify, describe, represent, compare, compose, and decompose shapes.

In order to meet this result, a grade one student:

- Fills in a given region with shapes with no gaps or overlaps
- Composes and decomposes shapes
- Identifies, describes, and compares shapes using common attributes and identifies the shapes that are the faces of solid figures
- Constructs and represents shapes and simple designs

**Connections**

**Algebra Connection:**
- Creates, extends, and finds missing elements in repeating numeric and geometric patterns
- Uses the equal sign to demonstrate equality in number relationships

**Number (Money) Connection:**
- Identifies the name and value of pennies, nickels, dimes, and quarters

**Number Connection:**
- Describes the relationships between shapes

**Data Analysis Connection:**
- Collects data and uses counting and comparing to answer questions and interpret graphs
Beliefs about Math:
Learning with understanding is essential to mathematical literacy. Mathematical literacy means having procedural and computational skills as well as conceptual understanding. The strands of mathematical proficiency are represented by the acronym UCARE...

Understand (Conceptual)  
Computing (Procedural Fluency)  
Applying (Strategic Competence)  
Reasoning (Adaptive Reasoning)  
Engaging (Productive Disposition)

Instructional Strategies:
- Providing 60 minutes of math instruction per day
- Maintaining an inquiry-based learning environment
- Facilitating interactive and thoughtful student discussions about mathematical concepts and processes
- Maintaining a high level of student engagement
- Helping students make connections to prior knowledge
- Using a variety of strategies to check for student understanding
- Using assessment to guide instruction
- Differentiating instruction to meet student needs

Number and Operations

Number

- Numbers to 100  
- Efficient Counting
- Repeating Patterns  
- Data Collection (Data Connection)

Addition & Subtraction

- Properties  
- Models
- Combinations to 10  
- Number Relationships
- Data Collection (Data Connection)

Key Concepts

Geometry and Measurement

- Time  
- Shapes and Solids
- Non-Standard Measurement  
- Tessellations (filling a region)
- Repeating Patterns (Algebra Connection)

Mathematics at the first grade level is designed to provide a common foundation of challenging mathematics for all students. First grade mathematics has two focal points: 1) number and operations and 2) geometry and measurement. Algebraic thinking and data analysis and probability are connections that weave throughout these focal points. Students develop understanding in each focal point and connection through experiences that emphasize problem solving, communication, representations, connections, and reasoning and proof.
# Essential Learning Results and Performance Indicators

## Number and Operations
Colorado State Standards 1 and 6

<table>
<thead>
<tr>
<th>Essential Learning Result 1.1</th>
<th>Develop an understanding of number in verbal, symbolic, and quantitative forms for whole numbers up to 100. In order to meet this result, a student:</th>
</tr>
</thead>
</table>
| Essential Learning Result 1.1 | a. Identifies, sequences, and writes numerals to 100  
Number (Money) Connection: Identifies the name and value of pennies, nickels, dimes, and quarters  

| Performance Indicators | b. Says the number word sequence: forward to 100 and backward from 30 starting at any number in the sequence (e.g., “Start counting up from 48.”)  
|------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Performance Indicators | c. Says the number directly before and after a given number in the same range  
| Performance Indicators | d. Uses and understands the ordinal sequence to describe relative position in time and space  
| Performance Indicators | e. Counts by tens forward and backward on decade  
| Performance Indicators | f. Represents two-digit numbers with materials grouped in tens and ones, with emphasis on the teen numbers as being made up of one ten and ones |
## Essential Learning Results and Performance Indicators (cont.)

<table>
<thead>
<tr>
<th>Performance Indicators</th>
<th></th>
</tr>
</thead>
</table>
| **g.**                  | Counts collections larger than 20 with efficient strategies (i.e., counting by multiples of 2s, 5s, and 10s)  
**Algebra Connection:** Creates, extends, and finds missing elements in repeating numeric and geometric patterns  
**Data Analysis Connection:** Collects data and uses counting and comparing to answer questions and interpret graphs |
| **h.**                  | Puts objects in a collection into equal groups and uses the group structure to help keep track of the number of objects |
**Essential Learning Results**  
and  
**Performance Indicators (cont.)**

<table>
<thead>
<tr>
<th>Essential Learning Result 1.2</th>
<th>Develop strategies to solve basic addition and subtraction problems. In order to meet this result, a student:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Uses a variety of representations to model join, part-part-whole, separate, and compare situations to demonstrate the meanings of addition and subtraction problems and solve them (see Table A)</td>
</tr>
<tr>
<td>b.</td>
<td>Models the inverse relationship of addition and subtraction and uses that relationship to solve problems</td>
</tr>
<tr>
<td>c.</td>
<td>Uses counting on or counting back to solve addition and subtraction problems when one addend or the subtrahend is 6 or less</td>
</tr>
<tr>
<td>d.</td>
<td>Adds or subtracts groups of 10 to or from any number in the range of 1 to 100 with materials</td>
</tr>
</tbody>
</table>
| e.                           | Uses the commutative property to add whole numbers (e.g., if $2 + 5 = 7$, then $5 + 2 = 7$)  
**Algebra Connection:** Uses the equal sign to demonstrate equality in number relationships (e.g., $6 = 6$, $4 + 2 = 3 + 3$) |
| f.                           | Makes conjectures about number relationships and properties in addition and subtraction situations (e.g., If one number is greater than another, and the same number is added to each, the first sum will be larger than the second.)  
**Algebra Connection:** Uses the equal sign to demonstrate equality in number relationships (e.g., $6 = 6$, $4 + 2 = 3 + 3$) |
| g.                           | Uses materials to develop strategies to solve addition and subtraction problems under 20 (e.g., associative property of addition, doubles plus one, adding and subtracting through ten) |
| h.                           | Combines and partitions numbers from 0-10 |

**Key academic vocabulary:** addition, difference, double, equal, graphs, groups, minus, number sentence, number words to 100, number sentence, ordinal numbers (e.g. first, second...), plus, subtraction, sum
### Essential Learning Results and Performance Indicators (cont.)

#### Geometry and Measurement
Colorado State Standards 4 and 5

<table>
<thead>
<tr>
<th>Essential Learning Results 1.3</th>
<th>Identify, describe, represent, and compare shapes. In order to meet this result, a student:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Indicators</td>
<td>a. Fills in a given region with shapes (e.g., pattern blocks) with no gaps or overlaps</td>
</tr>
</tbody>
</table>
|                               | b. Composes and decomposes shapes  
**Number Connection:** Describes the relationships between shapes (e.g., hexagon can be made from six triangles) |
|                               | c. Identifies, describes, and compares shapes using common attributes (e.g., number of sides) and identifies the shapes that are the faces of solid figures |
|                               | d. Constructs and represents shapes and simple designs (e.g., geometric quick images)  
**Algebra Connection:** Creates, extends, and finds missing elements in repeating numeric and geometric patterns |

<table>
<thead>
<tr>
<th>Essential Learning Results 1.4</th>
<th>Measure with non-standard units and develop knowledge of time. In order to meet this result, a student:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Indicators</td>
<td>a. Knows the sequence and number of months in a year</td>
</tr>
<tr>
<td></td>
<td>b. Tells time to the hour and half hour using analog and digital clocks</td>
</tr>
<tr>
<td></td>
<td>c. Uses non-standard units and tools to measure and compare length, capacity, and weight</td>
</tr>
</tbody>
</table>

**Key academic vocabulary:** geometric patterns, names of months, repeating patterns, shapes, solids, time to the nearest hour & half hour
### Table A
Types of Addition and Subtraction Problems

<table>
<thead>
<tr>
<th>Problem Type</th>
<th>(Result Unknown)</th>
<th>(Change Unknown)</th>
<th>(Start Unknown)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Join</strong></td>
<td>Connie had 5 marbles. Juan gave her 8 more marbles. How many marbles does Connie have altogether?</td>
<td>Connie has 5 marbles. How many more marbles does she need to have 13 marbles altogether?</td>
<td>Connie had some marbles. Juan gave her 5 more marbles. Now she has 13 marbles. How many marbles did Connie have to start with?</td>
</tr>
<tr>
<td><strong>Separate</strong></td>
<td>Connie had 13 marbles. She gave 5 to Juan. How many marbles does Connie have left?</td>
<td>Connie had 13 marbles. She gave some to Juan. Now she has 5 marbles left. How many marbles did Connie give to Juan?</td>
<td>Connie had some marbles. She gave 5 to Juan. Now she has 8 marbles left. How many marbles did Connie have to start with?</td>
</tr>
<tr>
<td><strong>Part-Part-Whole</strong></td>
<td>(Whole Unknown)</td>
<td>(Part Unknown)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connie has 5 red marbles and 8 blue marbles. How many marbles does she have?</td>
<td>Connie has 13 marbles. 5 are red and the rest blue. How many blue marbles does Connie have?</td>
<td></td>
</tr>
<tr>
<td><strong>Compare</strong></td>
<td>(Difference Unknown)</td>
<td>(Compare Quantity Unknown)</td>
<td>(Referent Unknown)</td>
</tr>
<tr>
<td></td>
<td>Connie has 13 marbles. Juan has 5 marbles. How many more marbles does Connie have than Juan?</td>
<td>Juan has 5 marbles. Connie has 8 more than Juan. How many marbles does Connie have?</td>
<td>Connie has 13 marbles. She has 5 more marbles than Juan. How many marbles does Juan have?</td>
</tr>
</tbody>
</table>

Elementary Math
Grade Two
Essential Learning Results
Grade Two

**Number and Operations:** Students develop an understanding of the structure and sequence of the base-ten numeration system.

In order to meet this result, a grade two student:

- √ reads, writes, compares, and orders whole numbers from 0-1000 including the use of symbolic notation
- √ says the number word sequence:
  - by 1s: forward to 1000 and backward from 100 starting from any number in the sequence
  - by 2s and 10s: forward and backward between 0-1000 starting from any number
  - by 5s: forward and backward between 0-100 starting from any multiple of 5
  - by 100s: forward and backward on the century 1-1000
- √ estimates a quantity for a group of 0-100 objects using landmark numbers
- √ creates equivalent representations of whole numbers

**Number and Operations:** Students develop fluency with multi-digit addition and subtraction supported by quick recall of addition and related subtraction facts to 20.

In order to meet this result, a grade two student:

- √ uses efficient mental strategies to calculate addition and subtraction facts to 20
- √ solves two-digit addition and subtraction problems to 100 using mental and written base-ten strategies and explains them using models and representations
- √ uses part-part-whole knowledge of quantity to model and solve related addition and subtraction problems
- √ models situations and solve problems involving missing addends and subtrahends with whole numbers to 100, emphasizing the concept of equivalency
- √ uses the commutative property to solve multi-digit addition problems and the associative property to solve multi-digit addition and subtraction problems
- √ adds and subtracts multiples of 100 in the range of 1 to 1000
- √ estimates sums and differences using landmark numbers

**Data Analysis:** Students develop an understanding of the four parts of a statistical investigation by posing questions, collecting data, creating informal and formal representations, and interpreting data.

In order to meet this result, a grade two student:

- √ creates questions for collecting categorical data
- √ collects data using observation, counting, and surveys
- √ creates a concrete or pictorial representation of data
- √ interprets and makes accurate statements about a representation of data including identifying the mode and shape of the data

**Geometry and Measurement:** Students develop an understanding of geometric representations and measurement through number.

In order to meet this result, a grade two student:

- √ constructs arrays to represent and compare numbers and identify halves, thirds, and fourths of arrays
- √ shows halves through making, finding, and describing mirror symmetries
- √ identifies rectangles and triangles based on the number of sides, angles, and right angles
- √ uses nonstandard units, as well as centimeters and inches, to collect quantifiable data related to length, weight, and capacity

**Connections**

**Number (Money) Connection:**
- Creates equivalent combinations for coins to $1.00

**Algebra Connection:**
- Recognizes and models repeating and growing patterns
- Describes qualitative change and quantitative change

**Measurement Connection:**
- Tells/reads time to nearest five minutes and minute

**Geometry Connection:**
- Arranges objects in arrays and determines quantity by skip or stress counting

**Probability Connection:**
- Determines which outcomes are the most likely, least likely, or equally likely when using a chance device
Beliefs about Math:
Learning with understanding is essential to mathematical literacy. Mathematical literacy means having procedural and computational skills as well as conceptual understanding. The strands of mathematical proficiency are represented by the acronym UCARE...

Understand (Conceptual)
Computing (Procedural Fluency)
Applying (Strategic Competence)
Reasoning (Adaptive Reasoning)
Engaging (Productive Disposition)

Instructional Strategies:
- Providing 60 minutes of math instruction per day
- Maintaining an inquiry-based learning environment
- Facilitating interactive and thoughtful student discussions about mathematical concepts and processes
- Maintaining a high level of student engagement
- Helping students make connections to prior knowledge
- Using a variety of strategies to check for student understanding
- Using assessment to guide instruction
- Differentiating instruction to meet student needs

Mathematics at the second grade level is designed to provide a common foundation of challenging mathematics for all students. Second grade mathematics has three focal points: 1) number and operations, 2) data and probability, and 3) geometry and measurement. Algebraic thinking is a connection that weaves throughout these focal points. Students develop understanding in each focal point and connection through experiences that emphasize problem solving, communication, representations, connections, and reasoning and proof.

Number and Operations

<table>
<thead>
<tr>
<th>Number</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers to 1000</td>
<td>(Measurement Connection)</td>
</tr>
<tr>
<td>Equivalent</td>
<td>Growing and Repeating Patterns (Algebra Connection)</td>
</tr>
<tr>
<td>Representations</td>
<td>Money (Measurement Connection)</td>
</tr>
<tr>
<td>Skip Counting</td>
<td></td>
</tr>
</tbody>
</table>

Addition & Subtraction

<table>
<thead>
<tr>
<th>Numeric Properties</th>
<th>Equivalency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combinations to 20</td>
<td>Place Value</td>
</tr>
<tr>
<td>Multi-Digit</td>
<td>Estimation</td>
</tr>
<tr>
<td>Place Value</td>
<td>Models</td>
</tr>
</tbody>
</table>

Key Concepts

Data

- Questions
- Representations
- Interpretation
- Data Collection
- Describing Change
- Simple Probability

Geometry and Measurement

- Length
- Rectangular Arrays
- Attributes of Shapes
- Symmetry
- Fractions (Number Connections)
### Essential Learning Results and Performance Indicators

**Number and Operations**  
Colorado State Standards 1 and 6

<table>
<thead>
<tr>
<th>Essential Learning Result 2.1</th>
<th>Develop an understanding of the structure and sequence of the base-ten numeration system. To meet this result, a student:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Reads, writes, compares, and orders whole numbers from 0-1000 including the use of symbolic notation (e.g., &lt;, &gt;, =)</td>
</tr>
</tbody>
</table>
| b.                           | Says the number word sequence:  
- By 1s: forward to 1000 and backward from 100 starting from any number in the sequence  
- By 2s and 10s: forward and backward between 0-100 starting from any number  
- By 5s: forward and backward between 0-100 starting from any multiple of 5  
- By 100s: forward and backward on the century 0-100  
**Measurement Connection:** Tells/reads time to nearest five minute and minute  
**Algebra Connection:** Recognizes and models repeating and growing patterns (e.g., two eyes for one head) and uses them to solve related problems  
**Geometry Connection:** Arranges objects in arrays and determines quantity by skip or stress counting |
| c.                           | Estimates a quantity for a group of 0-100 objects using landmark numbers                                                     |
| d.                           | Creates equivalent representations of whole numbers (e.g., 35 can be represented by 35 ones, 3 tens and 5 ones, or 2 tens and 15 ones)  
**Number (Money) Connection:** Creates equivalent combinations for coins to $1.00 (e.g., a quarter equals five nickels or two dimes and one nickel) |

**Colorado State Assessment Frameworks correlation**  
3rd-1.2.e  
3rd-5.1.a
### Essential Learning Results and Performance Indicators (cont.)

<table>
<thead>
<tr>
<th>Essential Learning Result 2.2</th>
<th>Develop fluency with multi-digit addition and subtraction supported by quick recall of addition and related subtraction facts to 20. In order to meet this result, a student:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Uses efficient mental strategies to calculate addition and subtraction facts to 20</td>
</tr>
<tr>
<td>b.</td>
<td>Solves two-digit addition and subtraction situations to 100 using mental and written base-ten strategies and explains them using models and representations</td>
</tr>
<tr>
<td>c.</td>
<td>Uses part-part-whole knowledge of quantity to model and solve related addition and subtraction problems (e.g., 19 + 3 = 22; 22 - 3 =19; 22 - 19 = 3)</td>
</tr>
<tr>
<td>d.</td>
<td>Models situations and solves problems involving missing addends and subtrahends with whole numbers to 100, emphasizing the concept of equivalency</td>
</tr>
<tr>
<td>e.</td>
<td>Uses the commutative and associative properties to solve multi-digit addition problems.</td>
</tr>
<tr>
<td>f.</td>
<td>Adds and subtracts multiples of 100 in the range of 1 to 1000</td>
</tr>
<tr>
<td>g.</td>
<td>Estimates sums and differences using landmark numbers</td>
</tr>
</tbody>
</table>

**Key academic vocabulary:** arrays, associative, digits, equal to/not equal, equation, equivalent, estimate, expanded form, greater than/less than, growing pattern, hundreds, landmark numbers, mental math, number sentence, number words to 1000, ones, skip counting, standard form, tens, time to nearest minute
Essential Learning Results
and
Performance Indicators (cont.)

Data Analysis
Colorado State Standard 3

Essential Learning Result 2.3
Develop an understanding of the four parts of a statistical investigation by posing questions, collecting data, creating informal and formal representations, and interpreting data. In order to meet this result, a student:

<table>
<thead>
<tr>
<th>Performance Indicators</th>
<th>Details</th>
<th>Colorado State Assessment Frameworks correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Creates questions for collecting categorical data</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>Collects data using observation, counting, and surveys</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>Creates a concrete or pictorial representation of data (e.g., tallies, pictographs, line plots, bar graphs, frequency tables, and Venn diagrams)</td>
<td></td>
</tr>
</tbody>
</table>
| d.                      | Interprets and makes accurate statements about a representation of data including identifying the mode and shape of the data. 

*Algebra Connection:* Describes qualitative change (e.g., student is growing taller) and quantitative change (e.g., the student grew 2 inches)

*Probability Connection:* Determines which outcomes are the most likely, least likely, or equally likely when using a chance device

3rd-3.2a, 3.2b, 3.3a

Key academic vocabulary: bar graph, category, chance, data, frequency, likely, line plots, mode, pictographs, probability, survey, tallies, unlikely, Venn diagrams
Essential Learning Results  
and 
Performance Indicators (cont.)

Geometry and Measurement  
Colorado State Standards 4 and 5

<table>
<thead>
<tr>
<th>Essential Learning Result 2.4</th>
<th>In order to meet this result, a student:</th>
</tr>
</thead>
</table>
| a.                             | Constructs arrays to represent and compare numbers and identify halves, thirds, and fourths of arrays  
**Number Connection:** Reads, writes, and identifies thirds, fourths, and halves  
**Measurement Connection:** Tell/read time to the nearest half and quarter hour |
| b.                             | Shows halves through making, finding, and describing mirror symmetries |
| c.                             | Identifies rectangles and triangles based on the number of sides, angles, and right angles |
| d.                             | Uses non-standard units, as well as centimeters and inches, to collect quantifiable data related to length, weight, and capacity |

**Key academic vocabulary:** angles, array, centimeters, fourths, halves, inches, right angles, quarter, sides, symmetry, thirds
Elementary Math
Grade Three
Essential Learning Results
Grade Three

Number and Operations: Students extend understanding of number (including common fractions) by building fluency with multi-digit addition and subtraction, mental computations, and understanding of place value in various context.

In order to meet this result, a grade three student:

√ says the number sequence using 1s, 2s, 10s, and 100s, forward to 10,000 and backward from 1000 starting from any number
√ reads, writes, orders, compares (using <, >, =), and locates on a number line, numbers to 10,000
√ estimates sums and differences for problems involving whole numbers to 10,000 using landmark numbers, and uses estimates to determine the reasonableness of solutions
√ generates equivalent representations for the same number, up to a four digit number
√ solves equations with missing elements involving addition and subtraction using the concept of equivalence
√ models and solves multi-digit addition and subtraction problems using efficient, accurate, flexible, and generalizable methods and writes number sentences to fit a given situation
√ uses models and representations to demonstrate addition and subtraction of proper fractions with common denominators of four or less
√ determines whether an exact or estimated answer is required for a given situation

Number and Operations: Students develop understandings of multiplication and division and their connections to fractions.

In order to meet this result, a grade three student:

√ solves a variety of contextualized multiplication and division problems with materials (e.g., how many in all, how many groups, how many in each group).
√ models the inverse relationship of multiplication and division and uses that relationship to solve problems
√ uses strategies based on the properties of addition and multiplication to solve multiplication and division problems with materials
√ demonstrates fluency of the basic multiplication facts of 0s, 1s, 2s, 3s, 5s, and 10s and use known facts to efficiently solve related multiplication problems
√ models, names, and compares common fractions as equal partitions of a whole or set and locates on a number line

Geometry and Measurement: Students describe and analyze properties of two- and three-dimensional objects including measurement, ideas of length, weight, time, and capacity.

In order to meet this result, a grade three student:

√ describes, compares, identifies, and creates shapes using attributes including symmetry, congruence, right angles, and parallel sides
√ describes, compares, identifies, and classifies solids using faces, edges, and vertices
√ hypothesizes and describes the results of decomposing and composing polygons to make other polygons
√ solves problems involving length, weight, capacity, time, and temperature by choosing the appropriate unit and tool and accurately measuring to the closest whole unit
√ estimates and measures the perimeter of polygons
√ estimates the measurements of familiar objects using appropriate standard units
√ reads and interprets pictorial representations of measurements of length, weight, temperature, and capacity

CONNECTIONS:

Geometry Connection
• Uses the vocabulary of point, lines, line segments, and rays when working with number lines
Number (Money) Connection:
• Identifies different combinations of coins up to $1.00 using concrete materials or pictures
• Uses money notation, adds and subtracts commonly used decimals, in which sums and differences do not exceed $10.00
Algebra Connection:
• Determines whether a sum or difference will be odd or even
• Identifies a rule using addition and subtraction patterns and solves a new problem using the rule
• Identifies, models, and determines a rule for patterns and relationships involving multiplication and division and uses them to solve problems
• Identifies odd and even numbers using grouping strategies
• Models and explains the properties of addition and multiplication
• Uses known facts to solve related problems
• Uses equations to show the relationship of multiplication to repeated addition
• Extends, creates, and finds missing elements of numeric and geometric repeating and growing patterns
Data Connection:
• Uses addition and subtraction to solve problems involving data
• Constructs, reads, and interprets displays of data
Probability Connection:
• Solves combination problems using organized lists or tree diagrams and relates them to multiplication sentences
Measurement Connection:
• Relates area to multiplication through the use of arrays
Beliefs about Math:
Learning with understanding is essential to mathematical literacy. Mathematical literacy means having procedural and computational skills as well as conceptual understanding. The strands of mathematical proficiency are represented by the acronym UCARE...

Understand (Conceptual)
Computing (Procedural Fluency)
Applying (Strategic Competence)
Reasoning (Adaptive Reasoning)
Engaging (Productive Disposition)

Instructional Strategies:
- Providing 60 minutes of math instruction per day
- Maintaining an inquiry-based learning environment
- Facilitating interactive and thoughtful student discussions about mathematical concepts and processes
- Maintaining a high level of student engagement
- Helping students make connections to prior knowledge
- Using a variety of strategies to check for student understanding
- Using assessment to guide instruction
- Differentiating instruction to meet student needs

Mathematics at the third grade level is designed to provide a common foundation of challenging mathematics for all students. Third grade mathematics has two focal points: 1) number and operations and 2) geometry and measurement. Algebraic thinking, data analysis, and probability are connections that weave throughout these focal points. Students develop understanding in each focal point and connection through experiences that emphasize problem solving, communication, representations, connections, and reasoning and proof.
### Essential Learning Results and Performance Indicators

**Number and Operations**  
*Colorado State Standards 1 and 6*

<table>
<thead>
<tr>
<th>Essential Learning Result 3.1</th>
<th>Performance Indicators</th>
<th>Colorado State Assessment Frameworks correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Students extend understanding of number (including common fractions) by building fluency with multi-digit addition and subtraction, mental computations, and understanding of place value in various context. In order to meet this result, a student:</td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Says the number sequence using 1s, 2s, 10s, and 100s, forward to 10,000 and backward from 1000 starting from any number</td>
<td>1.2a, 1.2b, 1.3a 4th-1.3a</td>
</tr>
</tbody>
</table>
| b.                           | Reads, writes, orders, compares (using <, >, =), and locates on a number line, numbers to 10,000  
  *Geometry Connection:* Uses the vocabulary of points, lines, line segments, and rays when working with number lines | 1.2a, 1.3a                                      |
| c.                           | Estimates sums and differences for problems involving whole numbers to 10,000 using landmark numbers, and uses estimates to determine the reasonableness of solutions | 1.5a, 6.4a                                     |
| d.                           | Generates equivalent representations for the same number, up to a four digit number (e.g., 25 = 20 + 5 or 10 + 15 = 25; 4159 = 4000 + 100 + 50 + 9; or four thousands, one hundred, five tens, nine ones)  
  *Number (Money) Connection:* Identifies different combinations of coins up to $10.00 using concrete materials or pictures | 1.2c, 1.2d 1.1c                                |
| e.                           | Solves equations with missing elements involving addition and subtraction using the concept of equivalence (e.g., 56 = 23 + ___; 7 + 5 = ___ + 10) | 1.4b                                           |
**Essential Learning Results and Performance Indicators (cont.)**

| Performance Indicators | f. | Models and solves multi-digit addition and subtraction problems using efficient, accurate, flexible, and generalizable methods and write number sentences to fit a given situation.  
*Number (Money) Connection:* Uses money notation, adds and subtracts commonly used decimals, in which sums and differences do not exceed $10.00  
*Algebra Connection:* Determines whether a sum or difference will be odd or even  
*Algebra Connection:* Identifies a rule using addition and subtraction patterns and solves a new problem using the rule (e.g., in/out tables)  
*Data Connection:* Uses addition and subtraction to solve problems involving data | 6.1a, 6.4b, 6.5a  
| g. | Uses models and representations to demonstrate addition and subtraction of proper fractions with common denominators of four or less | 6.2a  
| h. | Determines whether an exact or estimated answer is required for a given situation | 6.5b  

**Key academic vocabulary:** accurate, decimal, efficient, estimate, exact, expanded form, flexible, in/out tables, line, line segment, odd/even, open number sentence, point, ray, reasonableness, rule, standard form, t-chart
Essential Learning Results  
and  
Performance Indicators (cont.)

<table>
<thead>
<tr>
<th>Essential Learning Result 3.2</th>
<th>Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Develop understanding of multiplication and division and their connections to fractions. In order to meet this result, a student:</td>
</tr>
</tbody>
</table>
|                               | a. Solves a variety of contextualized multiplication and division problems with materials (e.g., how many in all, how many groups, how many in each group)  
Algebra Connection: Identifies, models, and determines a rule for patterns and relationships involving multiplication and division (e.g., in/out tables) and uses them to solve problems | 6.4b, 6.5a, 2.1b, 2.3a, 2.4a 4th-2.4a  
|                               | b. Models the inverse relationship of multiplication and division and uses that relationship to solve problems | 3rd-3.4a  
|                               | c. Uses strategies based on the properties of addition and multiplication (e.g., identity, zero, commutative, associative, distributive) to solve multiplication and division problems with materials  
Algebra Connection: Models and explains the properties of addition and multiplication  
Algebra Connection: Uses known facts to solve related problems  
Algebra Connection: Uses equations to show the relationship of multiplication to repeated addition (e.g., $3 \times 4 = 4 + 4 + 4$) | 1.4a, 1.4b |
### Essential Learning Results and Performance Indicators (cont.)

<table>
<thead>
<tr>
<th>Performance Indicators</th>
<th>d. Demonstrates fluency of the basic multiplication facts of 0s, 1s, 2s, 3s, 5s, and 10s, and uses known facts to efficiently solve related multiplication problems (e.g., doubling twice to multiply by four)</th>
<th>6.3a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>e. Models, names, and compares common fractions as equal partitions of a whole or set and locates on a number line (e.g., place 3 1/2 on a number line)</td>
<td>1.1b, 1.3b</td>
</tr>
</tbody>
</table>

**Key academic vocabulary:** combinations, common fractions, distributive property, division, equation, group, multiplication, operations, organized list, product, quotient, rule, remainder, tree diagrams, set
## Essential Learning Results and Performance Indicators

### Geometry and Measurement

**Colorado State Standards 4 and 5**

<table>
<thead>
<tr>
<th>Essential Learning Result 3.3</th>
<th>Performance Indicators</th>
<th>Colorado State Assessment Frameworks Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe and analyze properties of two- and three- dimensional objects including measurement ideas of length, weight, time, and capacity. To meet this result, a student:</td>
<td>a. Describes, compares, identifies, and creates shapes using attributes including symmetry, congruence, right angles, and parallel sides. <em>Algebra Connection: Extends, creates, and finds missing elements of numeric and geometric repeating and growing patterns</em></td>
<td>4.1a, 4.1b, 4.1c, 4.2a, 4.2d, 4th-4.1a, 4.1b, 4.2a, 4.2b, 4.2c, 4.2d, 5th-4.6b, 3rd-2.1a, 2.1b, 4th-2.1a, 2.1b</td>
</tr>
<tr>
<td></td>
<td>b. Describes, compares, identifies, and classifies solids using faces, edges, and vertices</td>
<td>4.2c, 4th-4.2c</td>
</tr>
<tr>
<td></td>
<td>c. Hypothesizes and describes the results of decomposing and composing polygons to make other polygons</td>
<td>4.2e</td>
</tr>
<tr>
<td></td>
<td>d. Solves problems involving length, weight, capacity, time, and temperature by choosing the appropriate unit and tool and accurately measuring to the closest whole unit. <em>Data Connection: Constructs, reads, and interprets displays of data</em></td>
<td>5.1c, 5.2a, 5.3a, 4th-5.1a, 5.1b, 5.2a, 5.4a, 5.5a, 5th-5.1a, 3rd-3.1a, 3.2a, 3.2b</td>
</tr>
</tbody>
</table>
# Essential Learning Results and Performance Indicators (cont.)

<table>
<thead>
<tr>
<th>Performance Indicators</th>
<th>e.</th>
<th>Estimates and measures the perimeter of polygons</th>
<th>4.3a, 5.3a, 4\textsuperscript{th}-4.3a, 5\textsuperscript{th}-5.1c</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f.</td>
<td>Estimates the measurements of familiar objects using appropriate standard units (e.g., a paper clip is about one inch; a pencil is about 10 centimeters)</td>
<td>5.4a, 4\textsuperscript{th}-5.4a</td>
</tr>
<tr>
<td></td>
<td>g.</td>
<td>Reads and interprets pictorial representations of measurements of length, weight, temperature, and capacity</td>
<td>5.1b</td>
</tr>
</tbody>
</table>

**Key academic vocabulary:** attribute, capacity, congruent, bar graph, edges, element, estimate, faces, graph, length, line plot, parallel, perimeter, perpendicular, pictograph, polygon, right angles, solid, symmetry, temperature, unit, vertices, weight
Elementary Math
Grade Four
Essential Learning Results
Grade Four

**Number and Operations:** Students develop an understanding of rational numbers including the connections between fractions and decimals.

In order to meet this result, a grade four student:

- √ reads, writes, compares, and orders whole numbers to 100,000, commonly used fractions, and decimals using models including the metric system
- √ identifies the closest whole numbers for commonly used fractions and decimals, including money
- √ identifies and generates equivalent forms and representations of whole numbers, commonly used fractions, and decimals
- √ solves addition and subtraction problems involving fractions with like denominators, decimals, and money to $100 with and without models

**Data Analysis:** Students develop an understanding of probability through the analysis of experimental data, fair and unfair games, and determining sample spaces.

In order to meet this result, a grade four student:

- √ determines the sample space (possible outcomes) of a scenario using a systematic method
- √ communicates the likelihood of events using quantitative and qualitative descriptions such as landmark fractions, certain, likely, unlikely, and impossible
- √ designs, tests, and analyzes simple games for fairness
- √ conducts repeated experiments and records, organizes, and graphs data in order to analyze it and make predictions about the probability of an event
- √ analyzes features of data distributions from experiments such as finding the median, mode, range, clusters, and outliers

**Connections:**

- **Measurement Connection:** Measures to nearest half-inch and centimeter
- **Algebra Connection:**
  - √ Demonstrates that multiplication is commutative and division is not
  - √ Identifies a rule using multiplication, addition, and subtraction to solve problems
  - √ Uses the associative and distributive properties to solve problems
- **Describes, extends and finds missing elements of patterns in tables and graphs**
- **Analysis Connection:**
  - √ Draws conclusions from a given data display
  - √ Selects, reads, and interprets scales on graphs

---

**BVSD Elementary Math Content Standards**

**Number and Operations:** Students develop fluency with whole number multiplication supported by quick recall of multiplication and related division facts.

In order to meet this result, a grade four student:

- √ demonstrates fluency with basic multiplication and related division facts (0-10)
- √ uses the inverse relationship of multiplication and division to solve problems
- √ analyzes multiplicative patterns in order to extend multiples, find factors, and identify prime, composite, and square numbers
- √ uses a variety of models to demonstrate the distributive property of multi-digit multiplication and division problems
- √ demonstrates fluency with multiplying whole numbers by powers of ten
- √ uses place value and properties of operations to develop and apply efficient, accurate, and generalizable methods to multiply multi-digit whole numbers
- √ Estimates appropriately for a given situation and uses a variety of strategies

---

**Geometry and Measurement:** Students develop an understanding of coordinate systems including identifying locations and determining areas.

In order to meet this result, a grade four student:

- √ estimates the area of any figure drawn on a grid
- √ solves problems involving the area of rectangles and squares
- √ identifies the relationship between area and perimeter of rectangles when one is held constant
- √ reads, plots, and identifies ordered pairs in quadrant one
- √ locates points, create paths, and measures distances on maps, scale drawings, and grids using provided scales

---

Elementary Math Curriculum - Adopted by Board of Education 06/10/2008
Beliefs about Math:
Learning with understanding is essential to mathematical literacy. Mathematical literacy means having procedural and computational skills as well as conceptual understanding. The strands of mathematical proficiency are represented by the acronym UCARE...

Understand (Conceptual)
Computing (Procedural Fluency)
Applying (Strategic Competence)
Reasoning (Adaptive Reasoning)
Engaging (Productive Disposition)

Instructional Strategies:
• Providing 60 minutes of math instruction per day
• Maintaining an inquiry-based learning environment
• Facilitating interactive and thoughtful student discussions about mathematical concepts and processes
• Maintaining a high level of student engagement
• Helping students make connections to prior knowledge
• Using a variety of strategies to check for student understanding
• Using assessment to guide instruction
• Differentiating instruction to meet student needs

Mathematics at the fourth grade level is designed to provide a common foundation of challenging mathematics for all students. Fourth grade mathematics has three focal points: 1) number and operations, 2) data and probability, and 3) geometry and measurement. Algebraic thinking is a connection that weaves throughout these focal points. Students develop understanding in each focal point and connection through experiences that emphasize problem solving, communication, representations, connections and reasoning and proof.

Number and Operations

<table>
<thead>
<tr>
<th>Rational Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers to 100,000</td>
</tr>
<tr>
<td>Fractions &amp; Decimals</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Multiplication &amp; Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Facts</td>
</tr>
<tr>
<td>Inverse Relationships</td>
</tr>
<tr>
<td>Numeric Properties (Algebra Connection)</td>
</tr>
</tbody>
</table>

Key Concepts

<table>
<thead>
<tr>
<th>Data &amp; Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphing</td>
</tr>
<tr>
<td>Sample Space</td>
</tr>
<tr>
<td>Descriptions of Data</td>
</tr>
<tr>
<td>Likelihood of Events</td>
</tr>
<tr>
<td>Patterns (Algebra Connection)</td>
</tr>
<tr>
<td>Data Collection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Geometry &amp; Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinate Graphing</td>
</tr>
<tr>
<td>Distance and Scale</td>
</tr>
<tr>
<td>Area</td>
</tr>
<tr>
<td>Perimeter</td>
</tr>
</tbody>
</table>
### Essential Learning Results and Performance Indicators

#### Number and Operations
Colorado State Standards 1 and 6

<table>
<thead>
<tr>
<th>Essential Learning Result 4.1</th>
<th>Performance Indicators</th>
<th>Colorado State Assessment Frameworks correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Develop an understanding of rational numbers including the connections between fractions and decimals. To meet this result, a student:</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>a.</strong> Reads, writes, compares, and orders whole numbers to 100,000, commonly used fractions, and decimals using models including the metric system</td>
<td>1.1a, 1.2a, 1.3b, 5.3a</td>
</tr>
<tr>
<td></td>
<td><em>Measurement Connection:</em> Measures to nearest half-inch and centimeter</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>b.</strong> Identifies the closest whole number for commonly used fractions and decimals, including money (i.e., rounding)</td>
<td>1.3b, 1.5b</td>
</tr>
<tr>
<td></td>
<td><strong>c.</strong> Identifies and generates equivalent forms and representations of whole numbers, commonly used fractions, and decimals (e.g., a quarter is 1/4 of a dollar and $0.25; 675 = 600 + 70 + 5; or 6 hundreds, 7 tens, and 5 ones make 675)</td>
<td>1.1a, 1.1b, 1.2b, 1.2c, 5th-1.3b</td>
</tr>
<tr>
<td></td>
<td><strong>d.</strong> Solves addition and subtraction problems involving fractions with like denominators, decimals, and money to $100 with and without models</td>
<td>1.1b, 6.2a</td>
</tr>
</tbody>
</table>
### Essential Learning Results and Performance Indicators (cont.)

<table>
<thead>
<tr>
<th>Essential Learning Results 4.2</th>
<th>Develop fluency with whole number multiplication supported by quick recall of multiplication and related division facts. To meet this result, a student:</th>
</tr>
</thead>
</table>
| a.                            | Demonstrates fluency with basic multiplication and related division facts (0-10)  
*Algebra Connection:* Demonstrates that multiplication is commutative and division is not |
|                               | 6.3a, 6.5a                                                                                                                            |
| b.                            | Uses the inverse relationship of multiplication and division to solve problems                                                             |
|                               | 1.4a                                                                                                                                  |
| c.                            | Analyzes multiplicative patterns in order to extend multiples, find factors, and identify prime, composite, and square numbers  
*Algebra Connection:* Identifies a rule using multiplication, addition, and subtraction to solve problems (e.g., in/out tables, and T-charts) |
|                               | 2.1a, 6.3c, 5<sup>th</sup>, 1.1c, 1.3a, 1.3c                                                                                         |
| d.                            | Uses a variety of models to demonstrate the distributive property of multi-digit multiplication and division problems                  |
|                               | 6.4b                                                                                                                                  |
### Essential Learning Results and Performance Indicators (cont.)

<table>
<thead>
<tr>
<th>Performance Indicators</th>
<th>e.</th>
<th>Demonstrates fluency with multiplying whole numbers by powers of ten</th>
</tr>
</thead>
<tbody>
<tr>
<td>f.</td>
<td>Uses place value and properties of operations to develop and apply efficient, accurate, and generalizable methods to multiply multi-digit whole numbers</td>
<td></td>
</tr>
<tr>
<td><strong>Algebra Connection:</strong> Uses the associative and distributive properties to solve problems [e.g., $12 \times 13 = (6 \times 13) + (6 \times 13)$]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g.</td>
<td>Estimates appropriately for a given situation and uses a variety of strategies (e.g., using landmark numbers) to find approximate answers</td>
<td></td>
</tr>
</tbody>
</table>

**Key academic vocabulary:** composite, decimals, factors, fractions, multiples, prime, rounding, square number, whole number

- 1.4b, 6.4b, 6.5a
- 5th-1.5b, 2.1c
- 1.5a, 1.5b, 6.4a, 6.5a, 6.5b
## Essential Learning Results and Performance Indicators (cont.)

### Data and Probability
Colorado State Standard 3

<table>
<thead>
<tr>
<th>Essential Learning Results 4.3</th>
<th>Performance Indicators</th>
<th>Colorado State Assessment Frameworks correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop an understanding of probability through the analysis of experimental data, fair and unfair games, and determining sample spaces. To meet this result, a student:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Determines the sample space (i.e., possible outcomes) of a scenario using a systematic method</td>
<td>3.3a, 3.3b, 3.4a, 5th: 3.7a</td>
<td></td>
</tr>
<tr>
<td>b. Communicates the likelihood of events using quantitative and qualitative descriptions such as landmark fractions, certain, likely, unlikely, and impossible</td>
<td>3.3b, 5th: 3.5a, 3.5b, 3.5c</td>
<td></td>
</tr>
<tr>
<td>c. Designs, tests, and analyzes simple games for fairness</td>
<td>3.3b, 5th: 3.6a</td>
<td></td>
</tr>
<tr>
<td>d. Conducts repeated experiments and records, organizes, and graphs data in order to analyze it and make predictions about the probability of an event</td>
<td>3.1a, 3.2a, 5th: 3.6b</td>
<td></td>
</tr>
<tr>
<td>e. Analyzes features of data distributions from experiments such as finding the median, mode, range, clusters, and outliers</td>
<td>3.2b</td>
<td></td>
</tr>
</tbody>
</table>

*Data Analysis Connection: Draws conclusions from a given data display*

*Data Analysis Connection: Selects, reads, and interprets scales on graphs*

*Algebra Connection: Describes, extends, and finds missing elements of patterns in tables and graphs*

Key academic vocabulary: analyze, certain, clusters, impossible, improbable, fair, landmark number, likely, likelihood, median, outcomes, outliers, powers of ten, predict, probability, probable, rule, range, sample space, scale, T-chart, unfair, unlikely
## Essential Learning Results and Performance Indicators (cont.)

### Geometry and Measurement

**Colorado State Standards 4 and 5**

<table>
<thead>
<tr>
<th>Essential Learning Results 4.4</th>
<th>Performance Indicators</th>
<th>Colorado State Assessment Frameworks correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop an understanding of coordinate systems including identifying locations and determining areas. To meet this result, a student:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Estimates the area of any figure drawn on a grid</td>
<td>5.3b, 5th: 5.4a</td>
<td></td>
</tr>
<tr>
<td>b. Solves problems involving the area of rectangles and squares</td>
<td>4.3a, 5.2a, 5.3b, 5th: 4.5b</td>
<td></td>
</tr>
<tr>
<td>c. Identifies the relationship between area and perimeter of rectangles when one is held constant</td>
<td>5th: 5.5a, 5.5b, 4.5a</td>
<td></td>
</tr>
<tr>
<td>d. Reads, plots, and identifies ordered pairs in quadrant one</td>
<td>4.4a, 5th: 4.4a</td>
<td></td>
</tr>
<tr>
<td>e. Locates points, creates paths, and measures distances on maps, scale drawings, and grids using provided scales</td>
<td>5th, 4.4c, 5.3a</td>
<td></td>
</tr>
</tbody>
</table>

**Key academic vocabulary:** area, axes, coordinate graphs, grids, ordered pairs, plot, points, scales
Elementary Math
Grade Five
Essential Learning Results
Grade Five

Number and Operations: Students develop an understanding of and fluency with addition and subtraction of rational numbers.

In order to meet this result, a grade five student:

✓ reads, writes, compares, and orders rational numbers including placing them on a number line
✓ generates and recognizes equivalent forms of rational numbers using words, symbols, concrete materials, and pictorial representations
✓ estimates sums and differences of whole numbers and fractions using the benchmarks 0, 1/2, and 1.
✓ adds and subtracts decimals and common fractions in context using a variety of models
✓ solves problems in context involving commonly used fractions, decimals, and percentages

Number and Operations: Students develop an understanding and fluency with division of whole numbers and select and apply appropriate operations to solve problems.

In order to meet this result, a grade five student:

✓ develops and applies efficient, accurate, and generalizable methods for solving division problems
✓ solves partitioning (how many groups) and sharing (how many in each group) division problems and interprets any remainders involved
✓ selects and applies appropriate operations to solve real-world problems and generates a real-world situation for a number sentence
✓ determines whether information given in a problem solving situation is sufficient, insufficient, or extraneous
✓ determines if an estimate or exact answer is necessary for a given situation, and uses estimation to determine if results are reasonable

Data Analysis: Students formulate questions, collect data, select and use appropriate graphical representations in order to interpret data and make inferences and predictions.

In order to meet this result, a grade five student:

✓ develops questions about categorical and numerical data and distinguishes between them
✓ collects data and describes how data collection methods affect the results
✓ organizes data by choosing and constructing appropriate data representations with suitable scales
✓ interprets data representations and patterns within data representations to make convincing arguments about a data set
✓ determines the mode, median, and range to make convincing arguments about a data set
✓ matches graphs, tables, data sets, and scenarios to one another

Geometry and Measurement: Students extend understanding of geometric concepts, properties, and relationships.

In order to meet this result, a grade five student:

✓ represents a solid in 2 dimensions
✓ sorts, classifies, and names shapes and solids using their attributes
✓ quantifies and classifies angles of polygons
✓ makes and tests conjectures about geometric relationships including measurements of shapes and solids
✓ predicts and describes the results of transformations for 2 dimensional shapes: reflections (flips), translations (slides), and rotations (turns)
✓ selects and uses the appropriate unit and tool to measure distance, capacity, and weight (customary and metric)
✓ selects and uses the appropriate unit and tool to measure length (including perimeter) to the required degree of accuracy (1/4 inch or centimeter), and estimates the length of common objects
✓ solves problems involving perimeter of polygons and area of rectangles

Connections:

Algebra Connection:
• Develops, tests, and explains conjectures about properties of whole numbers and commonly used fractions and decimals
• Recognizes that a variable represents an unknown quantity
• Identifies the properties of multiplication and addition and uses them to evaluate numeric expressions and solve equations
• Identifies, extends, describes, and represents numeric and geometric growth patterns using words, tables, graphs, simple equations
• Describes how change in one quantity affects change in another
• Identifies and compares constant and varying rates of change

Geometry/Measurement Connection:
• Determines the relationship between the number of cubic units that fill a rectangular prism and the dimensions of the prism
Beliefs about Math:
Learning with understanding is essential to mathematical literacy. Mathematical literacy means having procedural and computational skills as well as conceptual understanding. The strands of mathematical proficiency are represented by the acronym UCARE...

- Understand (Conceptual)
- Computing (Procedural Fluency)
- Applying (Strategic Competence)
- Reasoning (Adaptive Reasoning)
- Engaging (Productive Disposition)

Instructional Strategies:

- Providing 60 minutes of math instruction per day
- Maintaining an inquiry-based learning environment
- Facilitating interactive and thoughtful student discussions about mathematical concepts and processes
- Maintaining a high level of student engagement
- Helping students make connections to prior knowledge
- Using a variety of strategies to check for student understanding
- Using assessment to guide instruction
- Differentiating instruction to meet student needs

Mathematics at the fifth grade level is designed to provide a common foundation of challenging mathematics for all students. Fifth grade mathematics has three focal points: 1) number and operations, 2) data and probability, and 3) geometry and measurement. Algebraic thinking is a connection that weaves throughout these focal points. Students develop understanding in each focal point and connection through experiences that emphasize problem solving, communication, representations, connections, and reasoning and proof.

Number & Operations

Addition & Subtraction of Rational Numbers

<table>
<thead>
<tr>
<th>Ordering &amp; Comparing</th>
<th>Equivalent Representations</th>
<th>Estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Numeric Properties</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Algebra Connection)</td>
<td></td>
</tr>
</tbody>
</table>

Division

Partitioning, Sharing & Remainders

Variables & Equations (Algebra Connection)

Volume (Geometry Connection)

Data & Probability

Patterns

Collecting

Using Data

Displaying

Interpreting

Descriptions of Data

Categorical & Numerical Data

Rate of Change (Algebra Connection)

Key Concepts

Geometry & Measurement

Classification of Shapes, Solids and Angles

Perimeter and Area

Distance, Capacity, and Weight

Transformations (Flip, Slide, Turn)
### Essential Learning Results and Performance Indicators

#### Number and Operations
Colorado State Standards 1 and 6

<table>
<thead>
<tr>
<th>Essential Learning Result 5.1</th>
<th>Performance Indicators</th>
<th>Colorado State Assessment Frameworks correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Develop an understanding of and fluency with addition and subtraction of rational numbers. In order to meet this result, a student:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Reads, writes, compares, and orders rational numbers including placing them on a number line</td>
<td>1.1a, 1.2a, 1.2b</td>
</tr>
<tr>
<td></td>
<td>b. Generates and recognizes equivalent forms of rational numbers using words, symbols, concrete materials, and pictorial representations</td>
<td>1.1b, 1.3b, 1.4a</td>
</tr>
<tr>
<td></td>
<td>c. Estimates sums and differences of whole numbers and fractions using the benchmarks 0, 1/2, and 1 (e.g., 5/6 + 7/8 must be equal to an amount less than, but close to 2)</td>
<td>1.6a, 1.6b, 6.3b</td>
</tr>
<tr>
<td></td>
<td>d. Adds and subtracts decimals and common fractions in context using a variety of models (e.g., 1/4 + 3/8)</td>
<td>6.2d, 6.2e</td>
</tr>
</tbody>
</table>
|                              | e. Solves problems in context involving commonly used fractions, decimals, and percentages  
*Algebra Connection:* Develops, tests, and explains conjectures about properties of whole numbers and commonly used fractions and decimals (e.g., a factor of a number is also a factor of the multiples of that same number) | 6.1a, 1.5a                                     |
### Essential Learning Results and Performance Indicators (cont.)

<table>
<thead>
<tr>
<th>Essential Learning Results 5.2</th>
<th>Develop an understanding of an fluency with division of whole numbers and select and apply appropriate operations to solve problems. In order to meet this result, a student:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Develops and applies efficient, accurate, and generalizable methods for solving division problems</td>
</tr>
<tr>
<td>b.</td>
<td>Solves partitioning (how many groups) and sharing (how many in each group) division problems and interprets any remainders involved</td>
</tr>
</tbody>
</table>
| c.                            | Selects and applies appropriate operations to solve real-world problems and generate a real-world situation for a number sentence  
**Algebra Connection:** Recognizes that a variable represents an unknown quantity  
**Algebra Connection:** Identifies the properties of multiplication and addition and uses them to evaluate numeric expressions and solve equations (e.g., open number sentences)  
**Geometry/Measurement Connection:** Determines the relationship between the number of cubic units that fill a rectangular prism and the dimensions of the prism | 6.2b, 6.2c, 6.4b, 6.4c, 1.5b, 2.1b, 2.1c |
## Essential Learning Results and Performance Indicators (cont.)

<table>
<thead>
<tr>
<th>Performance Indicators</th>
<th>d. Determines whether information given in a problem solving situation is sufficient, insufficient, or extraneous</th>
<th>6.4a</th>
</tr>
</thead>
<tbody>
<tr>
<td>e.</td>
<td>Determines if an estimate or exact answer is necessary for a given situation, and uses estimation to determine if results are reasonable</td>
<td>6.3a, 6.3b, 6.4d</td>
</tr>
</tbody>
</table>

Key academic vocabulary: benchmark fractions, cubic units, extraneous, insufficient, percent, rational numbers, sufficient, variable, volume

## Data and Probability

**Colorado State Standard 3**

<table>
<thead>
<tr>
<th>Essential Learning Result 5.3</th>
<th>Formulate questions, collect data, select and use appropriate graphical representations in order to interpret data, and make inferences and predictions. In order to meet this result, a student:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Indicators</td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Develops questions about categorical and numerical data and distinguishes between them</td>
</tr>
<tr>
<td>b.</td>
<td>Collects data and describes how data collection methods affect the results</td>
</tr>
<tr>
<td>c.</td>
<td>Organizes data by choosing and constructing appropriate data representations with suitable scales (e.g., line plots, line graphs, bar graphs, pictographs, tables, and charts)</td>
</tr>
</tbody>
</table>
**Essential Learning Results and Performance Indicators (cont.)**

| Performance Indicators | d. | Interprets data representations and patterns within data representations to make convincing arguments about a data set.  
*Algebra Connection:* Identifies, extends, describes, and represents numeric and geometric growth patterns using words, tables, graphs, and simple equations.  
*Algebra Connection:* Describes how change in one quantity affects change in another.  
*Algebra Connection:* Identifies and compares constant and varying rates of change. | 3.1c, 3.3a, 3.4b, 3.6b, 2.1a, 2.2a, 2.3a, 2.5a |
| | e. | Determines the mode, median, and range to make convincing arguments about a data set. | 3.2a, 3.2b, 3.4b |
| | f. | Matches graphs, tables, data sets, and scenarios to one another. | 3.1d, 2.4a, 4.4b |

**Key academic vocabulary:** bar graphs, categorical/numerical, charts, constant, line graphs, line plots, pictographs, rate of change, tables, varying
# Essential Learning Results and Performance Indicators (cont.)

## Geometry and Measurement
Colorado State Standards 4 and 5

<table>
<thead>
<tr>
<th>Essential Learning Results 5.4</th>
<th>Performance Indicators</th>
<th>Geometry and Measurement</th>
<th>Colorado State Assessment Frameworks correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extend understanding of geometric concepts, properties, and relationships. In order to meet this result, a student:</td>
<td></td>
<td>Extend understanding of geometric concepts, properties, and relationships.</td>
<td></td>
</tr>
<tr>
<td>a. Represents a solid in 2 dimensions (e.g., recognize a 3-D figure from its net)</td>
<td>a. Represents a solid in 2 dimensions (e.g., recognize a 3-D figure from its net)</td>
<td>4.1a</td>
<td></td>
</tr>
<tr>
<td>b. Sorts, classifies, and names shapes and solids using their attributes</td>
<td>b. Sorts, classifies, and names shapes and solids using their attributes</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>c. Quantifies and classifies angles of polygons</td>
<td>c. Quantifies and classifies angles of polygons</td>
<td>5.1d, 5.1e</td>
<td></td>
</tr>
<tr>
<td>d. Makes and tests conjectures about geometric relationships including measurements of shapes and solids</td>
<td>d. Makes and tests conjectures about geometric relationships including measurements of shapes and solids</td>
<td>4.2b, 5.5a, 5.5b</td>
<td></td>
</tr>
<tr>
<td>e. Predicts and describes the results of transformations for 2 dimensional shapes: reflections (flips), translations (slides), and rotations (turns)</td>
<td>e. Predicts and describes the results of transformations for 2 dimensional shapes: reflections (flips), translations (slides), and rotations (turns)</td>
<td>4.6a</td>
<td></td>
</tr>
<tr>
<td>f. Selects and uses the appropriate unit and tool to measure distance, capacity, and weight (customary and metric)</td>
<td>f. Selects and uses the appropriate unit and tool to measure distance, capacity, and weight (customary and metric)</td>
<td>5.1a, 5.6a</td>
<td></td>
</tr>
<tr>
<td>g. Selects and uses the appropriate unit and tool to measure length (including perimeter) to the required degree of accuracy (1/4 inch or centimeter), and estimate the length of common objects</td>
<td>g. Selects and uses the appropriate unit and tool to measure length (including perimeter) to the required degree of accuracy (1/4 inch or centimeter), and estimate the length of common objects</td>
<td>5.1b, 5.1c, 5.6b</td>
<td></td>
</tr>
<tr>
<td>h. Solves problems involving perimeter of polygons and area of rectangles</td>
<td>h. Solves problems involving perimeter of polygons and area of rectangles</td>
<td>5.4a, 5.5a, 5.5b</td>
<td></td>
</tr>
</tbody>
</table>

**Key academic vocabulary:** attributes, net, rotations, transformations, translations