

Instructions for Scoring the Measurable Learner Objectives and Math Proficiencies
 Grades K – 8 Mathematics
 2008 – 2009

Measurable Learner Objectives Ranking:

In rating the Measurable Learner Objectives (MLOs) the reviewer should indicate for each MLO whether or not the material contains the objective listed. This inclusion should be what is contained in the materials so that students have the opportunity to learn the objective to mastery. This means if the objective is merely introduced, this would not be sufficient and would need to be marked as a “No”. If the objective only has partial coverage this situation should be indicated in the notes column.

If the indication is yes, the page number(s) should be indicated as to location of this objective. This will provide information for other stakeholder reviews as well as the work necessary to prepare to work with students using these materials. One should realize that no one set of materials may address all MLOs necessary. This notation provides feedback to objectives that will need support with other materials (purchased or internally developed).

Measurable Learner Objectives	Yes/ No	Page Number(s)
a. Use standard algorithms or procedures (built on conceptual understanding) to multiply and divide fractions and decimals efficiently and accurately.	Yes	p 27, 125

Mathematics Proficiencies Ranking:

In rating the Mathematics Proficiencies the reviewer should indicate whether or not the material supports each required proficiency level indicated for the objective. This inclusion should be what is contained in the materials so that students have the opportunity to learn the objective through the lens of the proficiency. If the material (indicated in the MLO portion) for the objective supports student work using the proficiency, mark the box with a “yes”, if it does not then mark with a “no”. This rank is an either it has it or it does not. At the bottom of each page please indicate the number of “yes” marks for each of the proficiencies. From the data for each page a percentage will be generated indicating the level the materials supported each proficiency.

Measurable Learner Objectives	Yes/ No	Page Number(s)	Conceptual Understanding	Procedural Fluency	Strategic Competence	Adaptive Reasoning
a. Use standard algorithms or procedures (built on conceptual understanding) to multiply and divide fractions and decimals efficiently and accurately.	Yes	p 27, 125	Yes	No		

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Teacher Resource Ranking:

A separate form shows bulleted suggestions for what should be included. This is not intended to be a check list, rather things to look for in determining the level the materials support teachers. The ranking should answer the question: “to what extent do the materials provide support for teachers in teaching the materials?” If the material contains adequate support indicate by marking a plus (+), if the materials do not contain adequate support indicate by marking a minus (-)

Teacher Edition Considerations

- Program material provides effective and challenging activities for all students.
- Program materials are easily accessible and useable by teachers (e.g. include additional math information and teacher dialogue examples and have an effective format).
- Program material provides mathematical information for teachers identifying the mathematics of the lesson.
- Program provides formative assessments and guidance for interpreting the assessments.
- Program provides summative assessments and guidance for interpreting the assessments.

Parent Resource Ranking:

A separate form shows bulleted suggestions for what should be included. This is not intended to be a check list, rather things to look for in determining the level the materials support parents. The ranking should answer the question: “to what extent do the materials provide support for parents in working with the materials?” If the material contains adequate support indicate by marking a plus (+), if the materials do not contain adequate support indicate by marking a minus (-)

Parent Resources/Materials

- Program contains materials that explain OBJECTIVES and provide examples for parents in supporting their children’s learning.

These materials could include:

Parent Letters

On line support

On line access to student text and activities

Homework (enrichment/practice/remedial)

Cultural and Ethnic Ranking:

Using the criteria indicated on the District’s Treatment of Cultural and Ethnic Groups form; indicate whether or not this material meets the necessary conditions. This “ranking” should be indicated with either a yes or no.

Conceptual Understanding refers to an integrated and functional grasp of mathematical ideas.
(Adding It Up p.118)

- Program enables students to learn new concepts and connects to what they already know.
- Concepts, procedures, and intellectual processes are connected through specific instructional activities.
- Program routinely represents mathematical situations in different ways and includes knowing how different representations can be useful for different purposes.

For Example, suppose students are adding fractional quantities of different sizes say $\frac{1}{3} + \frac{2}{5}$. They might draw a picture or use concrete materials of various kinds to show the addition. They might also represent the number sentence $\frac{1}{3} + \frac{2}{5} = ?$ as a story. They might turn to the number line, representing each fraction by a segment and adding the fractions by joining the segments. By renaming the fractions so that they have the same denominator, the students might arrive at a common measure for the fractions, determine the sum, and see its magnitude on the number line. By operating on these different representations, students are likely to use different solution methods. This variation allows students to discuss the similarities and differences of the representations, the advantages of each, and how they must be connected if they are to yield the same answer. Adding It UP p. 119

Procedural Fluency refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently. (Adding It Up p.121)

- The program includes basic skill practice on a regular basis to achieve or maintain fluency.
- The program supports students in understanding different procedural methods.(fluency and appropriateness)
- The program includes guidance to the student in identifying common errors and what to do about it. (accuracy)
- The program routinely includes opportunities for estimation/approximation and reasonableness of answer. (accuracy)

Example: Many children subtract the smaller from the larger digit in each column to get 26 as the difference between 62 and 48 (see Box 4-2).

Box 4–2 A common error in multi-digit subtraction

$$\begin{array}{r} 62 \\ - 48 \\ \hline 26 \end{array}$$

Adding It Up p. 123

Strategic Competence refers to the ability to formulate mathematical problems, represent them, and solve them. (Adding It Up p.124)

- The program expects students to use their own informal problem-solving strategies.
- The program guides students to build more effective problem-solving strategies and advanced understandings.
- The program guides students' mathematical thinking toward formulating their own problems.

Example:

At ARCO, gas sells for \$1.13 per gallon.
 This is 5 cents less per gallon than gas at Chevron.
 How much does 5 gallons of gas cost at Chevron?

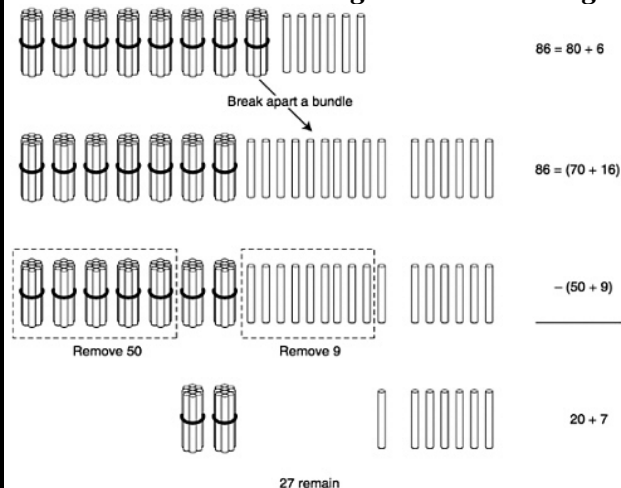
In a common superficial method for representing this problem, students focus on the numbers in the problem and use so-called keywords to cue appropriate arithmetic operations.²⁴ For example, the quantities \$1.83 and 5 cents are followed by the keyword *less*, suggesting that the student should subtract 5 cents from \$1.13 to get \$1.08. Then the keywords *how much* and 5 gallons suggest that 5 should be multiplied by the result, yielding \$5.40. Adding It Up p.125

Adaptive Reasoning refers to the capacity to think logically about the relationships among concepts and situations. Such reasoning is correct and valid, stems from careful consideration of alternatives, and includes knowledge of how to justify the conclusion. (Adding It Up p.129)

- The program expects students to clarify and justify their strategies verbally, graphically or in writing to themselves and others.
- The program includes opportunities for students to discuss [analyze] the benefits and limitations of various approaches.
- The program includes not only informal explanation and justification but also intuitive and inductive reasoning based on pattern, analogy, and metaphor.”

Example:

Box 4-3 Subtraction Using Sticks: Modeling $86-53=?$



Begin with 8 bundles of 10 sticks along with 6 individual sticks. Because you cannot take away 9 individual sticks, open one bundle, creating 7 bundles of 10 sticks and 16 individual sticks. Take away 5 of the bundles (corresponding to subtracting 50), and take away 9 individual sticks (corresponding to subtracting 9). The number of remaining sticks—2 bundles and 7 individual sticks, or 27—is the answer. Adding It Up p.128

Mathematics Adoption Committee Program: _____

Grade: _____

Committee Members: _____

Rating Scale: To what extent do the materials provide support for teachers in teaching the materials?

Contains adequate support (+), does not contain adequate support (-)

Rating _____

Teacher Edition Considerations

- Program material provides effective and challenging activities for all students.
- Program materials are easily accessible and useable by teachers (e.g. include additional math information and teacher dialogue examples and have an effective format).
- Program material provides mathematical information for teachers identifying the mathematics of the lesson.
- Program provides formative assessments and guidance for interpreting the assessments.
- Program provides summative assessments and guidance for interpreting the assessments.
- Program provides suggestions for pacing and grouping structures.
- Program provides suggestions, strategies, language supports for all learners (differentiation).
- Program provides information regarding scope and sequence of skills/concepts developed within the chapter.
- Technology is effectively incorporated into the program and is provided.
- Program includes appropriate materials for to achieve fluency (clarity, appropriate sequence and sufficient quality problems).

Comments:

Mathematics Adoption Committee **Program:** _____

Grade: _____

Committee Members: _____

Rating Scale: To what extent does the program contain support materials for parents? Contains adequate support - requiring minor or no district adaptations or creation (+), does not contain adequate support – requires major or complete creation or adaptation (-) **Rating** _____

Parent Resources/materials

- Program contains materials that explain OBJECTIVES and provide examples for parents in supporting their children’s learning.

These materials could include:

Parent Letters

On line support

On line access to student text and activities

Homework (enrichment/practice/remedial)

Resource book that can go home

scope and sequence

Comments:

Columbia Public Schools
Grade 1 Mathematics Curriculum Objectives

Grade Level Description: At first grade students begin to develop and refine their strategies for adding and subtracting numbers. They will be asked to think about and explain/share their reasoning for how they arrived at their answer. First graders will explore many mathematical properties such as commutative and associative. First graders should begin to realize that addition and subtraction are related and “un do” each other. They will explore geometry and continue to build on their geometry vocabulary as it relates to describing their world and the relationships between and among shapes and figures. By the end of first grade, students should know addition and subtraction (with sums and minuends to 20) and understand the relationship between the values of the digits in two-digit numbers.

Number and Algebra

Core Content A: Develop an understanding of whole number pattern and relationships, including grouping in tens and ones.

1. Understand and use the relative magnitude of two-digit numbers.

Measurable Learner Objectives	Y or N	Page #	Con Und	Prod Flu	Strat Comp	Adapt Rea	Intro	Master	Main tain	Notes:
a. Use a variety of representations for two-digit numbers, including objects, diagrams, number lines, words, and numerals.							x	x		
b. Read, write and order numbers through at least 100.							x	x		
c. Compare numbers through at least 100.							x	x		
d. Count to 100 by ones and tens.								x	x	
e. Write numbers up to 10 in words.							x	x		
f. Locate numbers up to 100 on a number line.							x	x		

2. Understand and use the relationship among the values of the digits in two-digit numbers.

Measurable Learner Objectives	Y or N	Page #	Con Und	Prod Flu	Strat Comp	Adapt Rea	Intro	Master	Main tain	Notes:
a. Recognize the place value of numbers (tens, ones) and value of each digit in a number (e.g. the 6 in 63 is 60 ones or 6 tens).							x			
b. Recognize the use of the word, <i>digit</i> , to refer to the numerals 0 through 9.							x	x	x	
c. Use different numerical representations of a number (e.g., 63 tens is 6 tens and 3 ones or 5 tens and 13 ones or 4 tens and 23 ones).							x	x		

Columbia Public Schools
Grade 1 Mathematics Curriculum Objectives

Number and Algebra										
Core Content A: Develop an understanding of whole number pattern and relationships, including grouping in tens and ones.										
3. Understand growing patterns and make conjectures about the properties of odd and even numbers.										
Measurable Learner Objectives	Y or N	Page #	Con Und	Prod Flu	Strat Comp	Adapt Rea	Intro	Master	Main tain	Notes:
a. Connect counting patterns (counting by 2s, 5s and 10s) with the operations of addition							x	x		
b. Describe how simple growing patterns (increasing and decreasing) are generated.								x	x	
c. Identify numbers missing from a well-defined counting sequence.							x	x	x	
d. Make conjectures about the patterns and							x			

Columbia Public Schools
Grade 1 Mathematics Curriculum Objectives

Number and Algebra										
Core Content B: Develop understanding of addition and subtraction, apply a variety of strategies for basic addition/subtraction facts and related addition										
1. Understand the meanings of simple addition and subtraction (with sums and minuends to 20) along with related concepts of place value, properties of operations, and relationships between operations.										
Measurable Learner Objectives	Y or N	Page #	Con Und	Prod Flu	Strat Comp	Adapt Rea	Intro	Master	Main tain	Notes:
a. Make connections among a variety of representations, including objects, length-based models (e.g., lengths of connecting cubes), number lines, ten frames, diagrams, words, and number sentences, in order to explain addition and subtraction situations (combining (addition), separating, (subtraction) comparing, and relating parts with wholes).							x			
b. Compare multiple strategies in order to relate addition and subtraction as inverse relationships.							x			
c. Explain and justify simple addition and subtraction strategies on the basis of properties of operations (Identity ($a=a$), commutatively ($a+b=b+a$), associatively ($(a+b)+c=a+(b+c)$), place value, and/or the inverse relationship between addition and subtraction.							x			
d. Skip Count by 2s and 5s, and count and backwards from 10.							x	x		
e. Know (memorize) addition and subtraction facts with sums and minuends to 20.								x		

Columbia Public Schools
Grade 1 Mathematics Curriculum Objectives

Number and Algebra										
Core Content B: Develop understanding of addition and subtraction, apply a variety of strategies for basic addition/subtraction facts and related addition and subtraction as inverse operations.										
2. Understand and use a variety of strategies (involving concepts of place value, properties of operations, and relationships among operations) to compute simple addition and subtraction problems with sums and minuends to 20.										
Measurable Learner Objectives	Y or N	Page #	Con Und	Prod Flu	Strat Comp	Adapt Rea	Intro	Master	Main tain	Notes:
a. Identify one more, one less than a given number when the result is less than 100.								x	x	
b. Identify ten more, ten less than a given number when the result is less than 100.								x	x	
c. Interpret the equal sign as a relational symbol indicating "the same quantity as."							x	x		
d. Add and subtract efficiently, both mentally and with paper and pencil.							x	x		
e. Use various forms of equations that involve addition and subtraction (e.g., $3 + 4 = \underline{\quad}$; $7 - \underline{\quad} = 3$; $3 + 4 = \underline{\quad} + 2$; $\underline{\quad} = 5 - 2$).							x	x		
f. Apply and justify the use of strategies involving known facts (i.e., doubling plus one, doubling minus one, making ten). Counting on, and counting back to solve problems, including basic addition and subtraction facts with sums and minuends to 20.							x			
g. Create and solve simple contextual problems involving addition for a variety of mathematical situations (combining, separating, comparing, and relating parts with wholes).							x	x		

Columbia Public Schools
Grade 1 Mathematics Curriculum Objectives

Geometry and Measurement

Core Content C: Develop an understanding of the relationships among geometric shapes.

1. Understand part-whole relationships and attributes of plane and solid figures.

Measurable Learner Objectives	Y or N	Page #	Con Und	Prod Flu	Strat Comp	Adapt Rea	Intro	Master	Main tain	Notes:
a. Name, create and sort (two-dimensional) geometric plane figures including circles, triangles, rectangles, squares (as special rectangles), rhombi, trapezoids, and hexagons.								x		
b. Name and sort solid (three-dimensional) figures including pyramids, rectangular prisms, cubes (as special rectangular prisms), cones, cylinders, and spheres.								x		
c. Compose (combine) and decompose (separate) two- and three-dimensional shapes to make other shapes.							x	x		
d. Recognize that when shapes are reflected (flipped), rotated (turned), or translated (slid), they maintain the same classification.							x			
e. Identify two-dimensional shapes that have line (mirror) symmetry and draw line(s) of symmetry.							x			

Columbia Public Schools
Grade 1 Mathematics Curriculum Objectives

Process Strand										
Problem Solving, Reasoning, Communication, Connections, Representations										
Measurable Learner Objectives	Y or N	Page #	Con Und	Prod Flu	Strat Comp	Adapt Rea	Intro	Master	Main tain	Notes:
a. Use a variety of strategies to solve problems.							x			
b. Make and investigate mathematical conjectures.							x			
c. Communicate mathematical thinking coherently and clearly to peers and teacher.							x			
d. Recognize and apply mathematics to contexts outside of mathematics.							x			
e. Create and use representations to organize, record, and communicate mathematical ideas.							x			
f. Select, apply, and translate among mathematical representations to solve problems.							x			

Number and Algebra

Core Content A: Develop an understanding of and fluency with multiplication and division of fractions and decimals

1. Multiplication and division of fractions and decimals

Measurable Learner Objectives	Yes/ No	Page Number(s)	Conceptual Understanding	Procedural Fluency	Strategic Competence	Adaptive Reasoning	Notes
a. Use standard algorithms or procedures (built on conceptual understanding) to multiply and divide fractions and decimals efficiently and accurately.							
b. Demonstrate an understanding of the relationship between decimals and fractions, including the relationship between finite decimals (terminating decimals) and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to explain the procedures for multiplying and dividing decimals.							
c. Multiply and divide fractions and decimals to solve problems, including multi-step problems and problems involving measurement.							

Core Content B: Connect ratio and rate to multiplication and division								
1. Ratio, Rates and Percents								
Measurable Learner Objectives	Yes/ No	Page Number(s)	Conceptual Understandin	Procedural Fluency	Strategic Competence		Adaptive Reasoning	Notes
a. Identify and write ratios as comparisons of part-to-part and part-to-whole relationships using appropriate notation.								
b. Justify why the same ratio could be represented in different ways (e.g. two different pairs of numbers).								
c. Solve single- and multi-step contextual problems involving ratios and rates.								
d. Represent and model ratios associated with whole-number percents that are less than or equal to 100%.								
2. Demonstrate flexibility with fractions, decimals, and percents								
Measurable Learner Objectives	Yes/ No	Page Number(s)	Conceptual Understandin	Procedural Fluency	Strategic Competence		Adaptive Reasoning	Notes
a. Convert between the fractional, decimal, and percent representations of a number.								
b. Compare (<, >, =) and order fractions, decimals, and percents efficiently and find their approximate locations on a number line.								

Core Content C: Write, interpret, and use mathematical expressions and equations							
1. Mathematical expressions and equations							
Measurable Learner Objectives	Yes/ No	Page Number(s)	Conceptual Understanding	Procedural Fluency	Strategic Competence	Adaptive Reasoning	Notes
a. Write mathematical expressions and equations that correspond to given situations, evaluate expressions for a given value, and use expressions and formulas to solve problems.							
b. Know (built on conceptual understanding) and be able to use the notation, language, and calculation of whole number exponents and roots.							
c. Describe how variables can represent numbers whose exact values are not yet specified, and use variables appropriately.							
d. Explain how expressions in different forms can be equivalent, and rewrite an expression to represent a quantity in a different way (e.g., to make it more compact or to feature different information).							
e. Know that the solutions of an equation are the values of the variables that make the equation true.							
f. Solve simple one-step equations by using number sense, properties of operations, and the idea of maintaining equality on both sides of an equation.							
g. Construct and analyze tables (e.g., to show quantities that are in equivalent ratios), and use equations to describe simple relationships (such as $3x = y$) shown in a table.							

Geometry and Measurement

Core Content D: Extend student understanding of two-dimensional figures

1. Represent, identify and classify geometric figures from written or verbal descriptions, measurements, and properties using sketches, figures represented on the coordinate plane, grids, or models.

Measurable Learner Objectives	Yes/ No	Page Number(s)	Conceptual Understandin	Procedural Fluency	Strategic Competence	Adaptive Reasoning	Notes
a. Identify and use the properties of two-dimensional shapes (including congruency, parallelism, perpendicularity, and symmetry) to classify quadrilaterals and triangles.							
b. Draw or create two-dimensional figures or models with specified measures and properties.							
c. Measure angles to the nearest degree.							

2. Develop and apply formulas for perimeter/circumference and area of quadrilaterals, circles, and composite figures made from these shapes.

Measurable Learner Objectives	Yes/ No	Page Number(s)	Conceptual Understandin	Procedural Fluency	Strategic Competence	Adaptive Reasoning	Notes
a. Use the properties of two-dimensional shapes to determine the relationships between the areas of various quadrilaterals and how these relationships are expressed in the formulas for the figures.							
b. Know and be able to use the formulas (built on conceptual understanding) for the circumference and area of circles.							
c. Know and be able to use the formulas (built on conceptual understanding) for the perimeter and area of quadrilaterals and triangles.							
d. Solve single- and multi-step contextual problems involving quadrilaterals and triangles (perimeter and area), circles (radius, diameter, circumference, and area), and composite figures made from these shapes.							

Data Analysis and Probability

Core Content E: Design and conduct sample surveys, explore random selection, and compare data distributions.

1. Formulate questions, identify the numerical attributes on which to collect data, begin work in understanding variability.

Measurable Learner Objectives	Yes/ No	Page Number(s)	Conceptual Understanding	Procedural Fluency	Strategic Competence	Adaptive Reasoning	Notes
a. Distinguish between a population and a sample, and identify methods of sample selection.							
b. Design and conduct sample surveys.							
c. Describe and use measures of central tendency (mean, median, and mode), discuss when it is appropriate to use each, and how each is influenced by outliers.							
d. Use and be able to explain similarities and differences between different types of data displays in comparing sample survey results.							
e. Be able to explain similarities and differences between interpretations of the mean as the “fair share” value for data and as the “balancing point” of the corresponding data distribution.							