

Grade 2 Mathematics

Mathematics Background for Grade 2 Teachers

Algebraic Reasoning: Patterns and Functions

Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools and technologies.

Central Understanding: Relationships shown through number patterns extend the understanding of number properties and operations.

Background: Translating the procedures and rules that govern patterns into mathematical expressions establishes the connection of patterns to algebraic representations. Conceptual understanding and procedural fluency are intertwined and equally necessary to support the examination of patterns. The exploration of the structures of our number system leads to the ability to discover relationships and make generalizations. These generalizations make apparent the connections between and among numeric and geometric concepts.

Numerical and Proportional Reasoning

Quantitative relationships can be expressed numerically in multiple ways in order to make connections and simplify calculations using a variety of strategies, tools and technologies.

Central Understanding: In the base-10 numeration system, number relationships can be described and represented in a variety of ways to support conceptual understanding and computation.

Background: Base-10 numeration includes counting in units and multiples of ones, tens and hundreds as representation of one quantity or number. Many of the ideas that contribute to computational fluency and flexibility with numbers are extensions of how numbers are related to 10. Decomposing and composing a number leads to efficient ways to think about quantities and computation. When numbers are taken apart and recombined displaying different relationships, basic facts are easier to remember. Similarly, the inverse relationship of addition and subtraction are reinforced.

Geometry and Measurement

Shapes and structures can be analyzed, visualized, measured and transformed using a variety of strategies, tools and technologies.

Central Understanding: Attributes can be compared by applying measurement to an object, situation or event.

Background: Measuring units depends upon and strengthens understanding of number through counting and comparison. Standard units of measurement become common referents for identification and description of objects. Geometric shapes and solids are identified, composed and decomposed based upon attributes and measurement.

Working with Data: Probability and Statistics

Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies.

Central Understanding: The same information can be organized in different ways.

Background: The gathering of data should be based on student-generated questions. The question to be answered must be formulated clearly to direct an investigation. In order to make data collection meaningful, it is necessary to identify an attribute or characteristic that can be measured. Different classifications of the same attributes will produce different organizations of the information or data collected.

Source: Model for Mathematics Curriculum, CSDE 2008

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Overview:

This curriculum is aligned to the 2005 Connecticut Mathematics Curriculum Frameworks and references the CMT 4th. Generation.

Each unit begins with a pre-assessment. This assessment is meant to be ungraded and is formative in that it allows teachers to better plan instruction for their students. The post-assessment is both summative and formative in nature. It is graded, and provides the teacher with data as to students who have mastered concepts and skills and those who may still need work in some areas.

Grade level expectations (GLEs) are coded (see below). For each GLE, or group of GLEs, activities are listed that are specific to those expectations. It is up to the teacher to use pre-assessment data to plan each unit for their students. Extensions, technology and other support materials (including those listed in the teachers' manuals) are listed to help with differentiation of math instruction.

Vocabulary:

A list of important mathematical vocabulary can be found at the end of each unit. Students need to become fluent with vocabulary so that they can communicate effectively in mathematics. It is suggested that math vocabulary be posted for each unit, and that students have opportunities to "define" terms using words, numbers, pictures, examples and by making connections to their lives or other areas of mathematics.

Connections to Connecticut Mastery Test:

Connecticut Mastery Test content is listed at the end of each unit. These are specific to the Grade 3 CMT. Sample items written on a second grade level can be found in the appendix for students to work with.

Pacing Guide:

Refer to the pacing guide for a sequence of units of study and activities.

Terms to help with pacing and planning:

The following terms are included in this curriculum guide to help teachers with their planning and pacing:

Explore: a topic which is not formally taught. For example, when kindergarteners use tiles to cover a desk, they are exploring the concept of area. They will not be asked for a definition of area nor will they be assessed on the topic.

Introduce: a skill which is presented by the teacher and students practice, but are not expected to master.

Master: a topic that most students are expected to know and understand. The topic has been introduced previously, practiced and students are able to apply the concept or skill 80% of the time.

Extend: activities that take students more deeply into a topic.

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Key to Coding:

This curriculum is based on the 2005 Mathematics Curriculum Framework and the 2007 Grade Level Expectations (which were written to further clarify what students should know and be able to do at each grade level.)

There are 4 content standards. Each includes two or three component statements.

Algebraic Reasoning: Patterns and Functions

- 1.1 Students should understand and describe patterns and functional relationships
- 1.2 Students should represent and analyze quantitative relationships in a variety of ways
- 1.3 Students should use operations, properties and algebraic symbols to determine equivalence and solve problems

Numerical and Proportional Reasoning

- 2.1 Students should understand that a variety of numerical representations can be used to describe quantitative relationships
- 2.2 Students should use numbers and their properties to compute flexibly and fluently, and to reasonably estimate measures and quantities

Geometry and Measurement

- 3.1 Students should use properties and characteristics of two- and three-dimensional shapes and geometric theorems to describe relationships, communicate ideas and solve problems
- 3.2 Students should use spatial reasoning, location and geometric relationships to solve problems
- 3.3 Students should develop and apply units, systems, formulas and appropriate tools to estimate and measure

Working with Data: Probability and Statistics.

- 4.1 Students should collect, organize and display data using appropriate statistical and graphical methods
- 4.2 Students should analyze data sets to form hypotheses and make predictions
- 4.3 Students should understand and apply basic concepts of probability

These component statements are further delineated in the Grade Level Expectations document. (See Appendix A).

Therefore, a statement coded 4.1.2 refers to collecting, organizing and displaying data. The .2 refers to the grade level expectation and will describe specific graphs that will be used.

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Unit 1: Place Value (to 100) and Patterns

Pacing: FALL (3 weeks)

In this unit, students develop number sense in place value, estimation, comparing numbers and creating and using patterns to solve problems.

Grade level expectations: The student will be able to:

- 1.1.2 Recognize, extend, and create repeating, growing, number patterns; e.g., skip counting, odd/even, counting on by 10. Describe the pattern and the rule used to make it.**
- 1.1.3 Replicate the pattern using a different representation, e.g., letters to numbers.**
- 1.1.4 Use patterns and the rules that describe the patterns to identify a missing object, objects with common or different attributes, and the complement of a set of objects.**
- 2.1.1 Locate, label, compare, and order whole numbers up to 100 using pictures, place value models, number lines, and benchmarks of 0, 10 and 100, including naming the number that is 10 more or 10 less than a given number.**
- 2.1.2 Represent whole numbers up to 100 by modeling and writing numbers in expanded forms, e.g., $37 = (3 \times 10) + (7 \times 1)$, and regrouped forms, e.g., $(2 \times 10) + (17 \times 1) = 37$, and use the forms to support computational strategies.**
- 2.1.8 Count whole numbers to 100 and beyond.**
- 2.1.9 Count on by tens from a given amount, e.g., 17, 27, 37, etc.**
- 2.1.10 Read and write numerals up to 100.**
- 2.1.11 Skip count by twos, fives, tens and hundreds to 100 and beyond.**
- 2.2.12 Determine whether a set of objects has an odd or even number of items by pairing objects and creating arrays.**
- 2.2.17 Use a variety of strategies to estimate numbers.**
- 3.3.5 Know the months of the year in order and locate dates, days, weeks and months on a calendar. Use the information to write and solve problems involving calendars.**

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Activities:

1. Students know the months of the year in order.

2. Students use calendars to locate dates, days, weeks and months. They use this information to solve problems involving calendars.

Teacher note: Students have ongoing practice throughout the year during morning meeting activities.

The children can write and solve problems such as:

- What was yesterday's date?
- October 31st. is on what day of the week?
- What is the date of the third Monday of this month?

3. Students use models to group ones and tens and write those numbers in regrouped and expanded form. MC 1-1

Teacher notes:

- Using models, students show and record regrouped form (20 ones = 2 tens) and expanded form (32 = 3 tens+2 ones **or** 3 groups of ten and 2 groups of 1, which will eventually translate to (3X10) + (2X1) in grade 3.)
- Students should have many opportunities to write numbers in regrouped form by trading tens and ones and recording, such as, 38 = 3 tens and 8 ones, 2 tens and 18 ones, 1 ten and 28 ones or 38 ones. The activity "Different Ways" (see appendix) included questions for discussion and extensions.

4. Students identify place value for numbers to 100. MC 1-2

5. Students read and write numbers to 100. MC 1-4

6. Students estimate quantity. MC 1-5

Teacher note: Provide many opportunities for students to use concrete materials to estimate, then count. Estimation Jar activities are appropriate.

7. Using a number line, students order numbers to 100. MC 1-6

Additional activities:





- Arrange benchmarks by 10s to 100 along a number line. Give children cards with numbers to place on the number line. Repeat activity using number lines of 100-200, 400-500, 900-1,000. When children have progressed, use number lines from 0-1,000 with benchmarks of 100s. There should be numerous whole class and individual opportunities for these activities.
- Use a meter stick or draw a line about 100 centimeters long and mark each end. Label equidistant tens (decimeters) on the line. Locate a point and mark it with an arrow. Have children identify the number indicated by the arrow and identify the number that is ten more and ten less. Repeat with hundreds when appropriate.

8. (Introduce) Students compare numbers to 100 using the symbols <, >, =. MC1-7

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9. Students create and describe patterns. MC 1-8

Teacher note:

- Work with both repeating and growing patterns. See appendix for repeating pattern practice “Patterns”
- Have students replicate a pattern using a different representation, such as AAB, 112, clap-clap-snap, etc.
- Present patterns with missing components to identify and share strategies for finding and writing solutions, e.g., 2, 4, __, 8, 10.
- Give children varied opportunities to analyze patterns rotating figures or shapes (such as    ) and numbers.

10. Students use number patterns on a hundreds chart to solve problems. MC 1-10

Teacher note:

- Have students use the hundred chart to count by tens from a given number, such as 14, 24, 34, etc. by moving down the columns.
- Have students use the hundred chart to count by 2s and 5s (skip counting).

Additional activity: Have children circle numbers on a hundreds chart as you give clues such as: Circle the number that means a dozen or two tens and five ones or the number of days in this month.

11. Students determine whether a set of objects has an even or odd number by pairing objects.

Problem-solving strategies:

Students Use Logical Reasoning to solve problems. MC 1-3

Students Draw a Picture to solve problems. MC 1-9

Teacher note: Additional samples for problems using the above strategies can be found in *The Problem Solver* and *Problem Solving Experiences in Mathematics*.

Electronic Resources:

Internet 4 Classrooms http://www.internet4classrooms.com/skills_2nd.htm#math - provides math activities and skill builders for grade 2

Score Mathematics <http://score.kings.k12.ca.us/number.sense.html> - activities linked to both California and NCTM standards

Apples for the Teacher <http://www.apples4theteacher.com/math.html> - site for math interventions, interactive games, puzzles, and printables

National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/grade_g_1.html - interactive online manipulatives listed by grade and topic

Illuminations <http://illuminations.nctm.org/> NCTM website providing activities and lessons (many interactive) by grade level.

MathWire www.mathwire.com provides standard-based math activities by grade level

In On the Ground Floor <http://www.creativille.org/groundfloor/index.htm> - grade 2 skills aligned to CT GLEs (click on CT)

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UNIT 1 VOCABULARY

about, after, almost, before, between, calendar, close to, days, digit, estimate, even, group, growing pattern, is equal to(=), is greater than (>), is less than(<),less than, months, more than, number line, odd, ones, pattern, place value, regroup, repeating pattern, same, skip count, tens, trade, weeks

CMT CONNECTIONS

- 1A.** Solve problems involving one more/less or 10 more/less using two-digit numbers.
- 1C.** Identify alternative forms of expressing 2-digit whole numbers using regrouping.
- 1D.** Use place value concepts to identify and compare the magnitude and value of digits in two- and three-digit numbers.
- 2A.** Relate whole numbers to pictorial representations of base ten blocks and vice versa.
- 2D.** Identify points representing two- and three-digit whole numbers on a number line and vice versa.
- 4A.** Order two- and three-digit whole numbers
- 4B.** Describe magnitude of two- and three-digit whole numbers.
- 14B.** Solve problems involving time, elapsed time (15-minute increments) and calendars.
- 22A.** Extend or complete patterns, or identify rules using numbers and attributes.
- 22B.** Extend or complete patterns and state rules using numbers and attributes.
- 24A.** Identify objects that are the same or different by one attribute.
- 24B.** Sort objects into two groups by a common attribute..

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Unit 2: Basic addition and subtraction facts

Pacing: FALL (4 weeks)

In this unit, students learn strategies for basic addition and subtraction facts. Students master facts with sums and differences to 20.

Grade level expectations: The student will be able to:

1.3.7 Demonstrate an understanding of equivalence or balance of sets using objects, models, diagrams, numbers whole number relationships (operations) and the equals sign, e.g., $2 + 3 = 5$ is the same as $5 = 2 + 3$ and the same as $4 + 1 = 5$.

2.2.14 Solve problems using addition and subtraction facts involving sums and differences to 20 with flexibility and fluency.

Teacher note: When working with addition and subtraction, use the terminology part + part = whole, and whole – part = part as you develop this concept.

Activities:

1. Students learn that the order of addends does not affect the sum. MC 2-1

Teacher note:

- Use different colored objects (unifix cubes) to show the part-part-whole relationship (three yellow and four red equals seven.)
- See H.O.T problems on pg. 56 to show equivalence. (required)
- Mad Minute worksheets are included in the appendix if you wish to use them for practice.

2. Students review using a number line to count on. MC 2-2

3. Students use doubles and near doubles to find sums. MC 2-4 and 2-5

4. Students use make a ten to solve addition problems. MC 2-6

Teacher note: H.O.T problems on pg. 72 for missing numbers in a pattern and describing the pattern in writing. (required)

5. Students group addends differently to find sums. MC 2-7

6. Given an addition story problem, students write a number sentence.

Teacher note: Students should identify key words such as in all, altogether, total, sum.

7. Given a basic number sentence (such as $3 + 2 = \square$), students write an addition story problem .

8. Using a number line, students count back to find the difference. MC 3-1

9. Students subtract all or none to find the difference. MC 3-2

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10. Students use doubles to subtract. MC 3-3

11. Given a subtraction story problem, students write a number sentence.

Teacher note: Students should identify key words such as difference, how many more, left, fewer.

12. Given a basic number sentence (such as $3 - 2 = \square$), students write a subtraction story problem.

13. Students use related addition facts to subtract. MC 3-5

14. Students find missing addends. MC 3-6

15. Students use related facts to write fact families. MC 3-7

Teacher note: see H.O.T. problem pg. 104 (required)

16. Students use function machines to solve problems and find patterns. See appendix for *Ground Works: Algebraic Thinking* pgs. 88-95.

Problem-solving strategies:

Students Act it Out to solve problems. MC 2-3

Students Draw a Picture to solve problems. MC 2-8

Students use Guess and Check to solve problems. MC 3-4

Students Write a Number Sentence to solve problems. MC 3-8

Teacher note: Additional samples for problems using the above strategies can be found in *The Problem Solver* and *Problem Solving Experiences in Mathematics*.

Post Assessment Unit 2

Electronic Resources:

Ten Frame <http://illuminations.nctm.org/ActivityDetail.aspx?ID=75> Student interactive site for using a 10-frame to learn basic facts.

UNIT 2 VOCABULARY

add, addend, altogether, count back, count on, sum, difference, doubles, fact family, in all, subtract, total

CMT CONNECTIONS

6A. Add and subtract facts to 18.

23A. Solve simple one-step algebraic equations involving addition, subtraction and fact families.

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Unit 3: Working with Data and Probability

Pacing: FALL (2 weeks)

In this unit, students collect, organize and analyze data. They will also apply basic concepts of probability.

Grade level expectations: The student will be able to:

4.1.1 Pose questions that can be used to guide data collection, organization and representation.

4.1.2 Collect and systematically organize and represent the data that answer the questions using lists, charts and tables, tallies, glyphs (coded pictures), picture graphs and bar graphs.

4.2.3 Describe data that have been organized and make comparisons using terms such as largest, smallest, most often or least often.

4.2.4 Determine patterns and make predictions from data displayed in tables and graphs.

4.3.5 Describe and explain the likelihood of the occurrence of various events. State possibilities, make predictions and test the predictions in practical situations.

4.3.6 Conduct simple probability investigations involving activities of chance and games with number cubes and spinners; record, graph and describe the results of the investigations.

Activities:

1. Students use glyphs to show data.

Teacher notes:

- See samples in appendix for seasonal glyphs.
- Find additional samples at www.mathwire.com
- Have students interpret each others glyphs.

2. Students take a survey and organize data using a tally chart. MC 4-1

3. Students create picture graphs to show data. MC 4-2

4. Students analyze and interpret picture graphs. MC 4-3

Teacher note: see H.O.T.problem on pg. 122 (required) to justify thinking.

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5. Students create bar graphs to show data. MC 4-5

6. Students analyze and interpret bar graphs. MC 4-6

Additional activities:

- Provide children with published graphs, from sources such as children’s magazines, social studies and science materials. Have children analyze the information in the graph and ask each other questions that can be answered with the information in the graph.
- Have children examine data in the class attendance chart, weather chart or calendar to describe any noticeable patterns and make predictions.
- Give each child an individual box of raisins. Use at least two different brands of raisins. Have children estimate the number of raisins in each box before counting, and then compare the actual counts to their estimates. Lead the class in the discussion and creation of a graph using the raisin boxes. Are all boxes of raisins created equal? Which brand should your family purchase?

Teacher note: provide ongoing opportunities throughout the year for students to collect data and make graphs.

7. Students describe the likelihood of events. MC 4-7

Teacher note: Have the children discuss the likelihood of events such as:

- It will rain tomorrow.
- George will go to bed late tonight.
- I am going on vacation tomorrow.
- Have the children describe or make up events that are likely and unlikely to occur and justify their thinking.

8. Students investigate probability using spinners. “Spinner Experiment” see appendix. Students repeat this experiment using different spinners. “More Spinners” see appendix.

Additional activity:

- See www.mathwire.com/archives/apr06.html for other spinner activities

9. Students investigate probability using dice. “Roll One Die” see appendix.

10. Students investigate probability using coins.

Children predict how often heads and tails come up when a coin is tossed 10 times. Have two children toss a coin 10 times each. Record the results with tallies for the number of heads and tails. How do the number of heads and tails compare? Recruit three more volunteers and then five more to repeat the process. Discuss the results after each group has completed the tosses. Combine the tallies and compare the volunteers’ results with individual predictions.

Problem-solving strategies:

Students Make a Table to solve problems. MC 4-4

Students Make an Organized List to solve problems. 4-8

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Teacher note: Additional samples for problems using the above strategies can be found in *The Problem Solver* and *Problem Solving Experiences in Mathematics*.

Post Assessment Unit 3

Electronic resources:

Eye to Eye: <http://illuminations.nctm.org/LessonDetail.aspx?ID=L169> - students collect data on eye color

What's the Weather? <http://illuminations.nctm.org/LessonDetail.aspx?ID=L196> - students analyze information represented by pictographs.

UNIT 3 VOCABULARY

bar graph, data, equally likely, graph, glyph, key, less likely, more likely, picture graph (pictograph), predict, survey, tally marks, table

CMT CONNECTIONS

19A. Identify correct information from tables, bar graphs, pictographs and charts.

19B. Create bar graphs and pictographs from data in tables and charts.

21A. Identify correct solutions to problems involving elementary notions of probability.

25A. Solve extended numerical and statistical problems.

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Unit 4: Computation: Using the understanding of place value and basic facts, students add and subtract two-digit numbers.

Pacing: WINTER (3 weeks)

Grade level expectations: The student will be able to:

2.2.15 **Add two-digit numbers with and without regrouping. Subtract two-digit numbers without regrouping** and with regrouping using models.

2.2.16 Determine when an estimate for a problem involving two- and three-digit numbers is appropriate or when an exact answer is needed.

2.2.17 **Use a variety of strategies to estimate solutions and to determine if a solution to a computation or word problem reflecting real-world experiences involving addition and subtraction of two- and three-digit whole numbers is reasonable.**

Activities:

1. Students use addition facts to add tens. MC 5-1
2. Students count on by tens and ones to find sums. MC 5-2
3. Students use regrouping to find sums. MC 5-4
4. Students add one-digit numbers to two-digit numbers with and without regrouping. MC 5-5
5. Students add two-digit numbers with and without regrouping. MC 5-6
6. Students estimate sums by rounding. MC 5-7

Teacher note:

- Students should round 2-digit numbers to the nearest ten and 3-digit numbers to the nearest hundred. See appendix for rounding charts “Strategies for CMT Strand 11” and “Estimating Solutions to Problems”.
7. Students add three two-digit numbers. MC 5-8
 8. Students use subtraction facts to subtract tens. MC 6-1
 9. Students count back by tens and ones to find differences. MC 6-2
- Additional Activity:* “Amazing Equations” see appendix.

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Problem-solving strategies:

Students Work Backwards to solve problems. MC 5-3

Students use Guess and Check to solve problems. 5-9

Students Write a Number Sentence to solve problems. 6-4

Teacher note: Additional samples for problems using the above strategies can be found in *The Problem Solver* and *Problem Solving Experiences in Mathematics*.

Post Assessment Unit 4

Electronic resources:

Comparing Connecting Cubes <http://illuminations.nctm.org/LessonDetail.aspx?id=U41> students explore five models of subtraction (counting, sets, number line, balanced equations, and inverse of addition) using connecting cubes.

In On the Ground Floor <http://www.creativille.org/groundfloor/index.htm> - grade 2 skills aligned to CT GLEs (click on CT)

A counting lesson for two digit numbers <http://www.sasked.gov.sk.ca/docs/elemath/gr2lessp.html> - provides integrated lesson plans

UNIT 4 VOCABULARY

estimate, regroup, round

CMT CONNECTIONS

4C. Round two-digit whole numbers in context.

5B. Identify the appropriate operation or number sentence to solve a story problem.

9A. Solve simple story problems involving addition (with/without regrouping) or subtraction (without regrouping).

9B. Solve simple story problems involving addition (with/without regrouping) or subtraction (without regrouping) with extraneous information.

10A. Identify the best expression to find an estimate.

11A. Identify a reasonable estimate to a problem.

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Unit 5: Money

Pacing: WINTER (2 weeks)

In this unit, students count coins, use dollars and add and subtract money.

Grade level expectations: The student will be able to:

2.2.18 Determine and compare the value of pennies, nickels, dimes, quarters and half dollars to \$1.

2.2.19 Count, compare and trade sets of pennies, dimes and dollars up to \$10.00

Activities:

1. Students examine coins with a hand lens to gather information about coins and to compare coins. “Coins and Magnifiers” See appendix.
Additional activity: As an extension, students play “The Matching Game” to identify coins. See appendix.

2. Students use skip counting and counting on strategies to find the value of a group of coins. MC 7-1

3. Students find the value of a group of coins containing quarters and half-dollars. MC 7-2

Additional activities:

- Students trade coins by playing “Race for a Quarter” See appendix.
- Students sort and graph coins in an activity called “Scoops of Coins” See appendix.
- Literature connection: poem *Smart* by Shel Silverstein. See appendix,.

4. Students use pennies, dimes and dollars to count mixed sets to \$10.00.

5. (Extend) Students use strategies to find the value of a group of coins. MC 7-3

6. (Extend) Students use coins to make one dollar. MC 7-5

7. (Extend) Students add money. MC 7-6

Problem-solving strategies:

Students Act it Out to solve problems MC 7-4

Students Act it Out to solve problems. MC 7-8

Teacher note: Additional samples for problems using the above strategies can be found in *The Problem Solver* and *Problem Solving Experiences in Mathematics*.

Post Assessment Unit 5

Electronic resources: MathWire www.mathwire.com provides standard-based math activities by grade level

UNIT 5 VOCABULARY cent (*c*), dime, dollar (\$), half-dollar, nickel, penny, quarter, trade, value

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Unit 6: Temperature and time.

Pacing: WINTER (2 weeks)

In this unit, students read and write temperature and time.

Grade level expectations: The student will be able to:

3.3.6 Solve problems involving telling time, including estimating and measuring the length of time needed to complete a task, to the half-hour using analog and digital clocks.

3.3.7 Use measurement tools, such as thermometers, to measure temperature.

Activities:

1. Students estimate temperature and read a thermometer. MC 8-1
2. Students use a thermometer to gather data. MC 8-7
3. Students estimate time MC 8-2
4. Students use analog and digital clocks to tell time to the hour and half-hour. MC 8-3

Alternate Activities:

- The children create a journal entry describing their day at school. Stamp a clock face on the journal page and write a time underneath that has been written on the board. Each child should draw hands on the clock face to show the time correctly. When the actual time of day on the classroom clock matches the time on the journal page, students record what they are doing in pictures and words next to the correct clock face.
 - 30 minutes ahead activity
5. (Extend) Students tell time to the quarter hour. MC 8-5

Problem-solving strategies:

- a. Students Look for a Pattern to solve problems. MC 8-4
- b. Students Make a Table to solve problems. MC 8-8

Post Assessment Unit 6

Electronic resources:

In On the Ground Floor <http://www.creativille.org/groundfloor/index.htm> - grade 2 skills aligned to CT GLEs (click on CT)

UNIT 6 VOCABULARY

clock, degrees, half hour, hour, minute, scale, second, thermometer, temperature

CMT CONNECTION

14A. Tell time to the nearest hour, half-hour and quarter-hour using analog and digital clocks.

14B. Solve problems involving time, elapsed time (15-minute increments) and calendars.

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Unit 7: Fractions

Pacing: WINTER (2 weeks)

In this unit, students identify and name fractions representing parts of a whole and parts of a set.

Grade level expectations: The student will be able to:

2.1.4 Use a variety of models and familiar objects to compare, order and estimate parts of a whole using the unit fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$.

2.1.5 Use a variety of models to represent and describe parts of groups as unit fractions $\frac{1}{2}$, through $\frac{1}{10}$.

2.1.6 Estimate and determine $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ of a small group of up to 20 objects, such as finding $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ of 12 cookies.

Activities:

1. Using area models, students name fractional parts of a whole (unit fractions). MC. 9-1
2. (Introduce) Using area models, students name fractional parts of a whole (fractions with more than one equal part.) MC 9-2
3. (Introduce) Using area models, students name fractions equal to one whole. MC 9-4
4. (Introduce) Students use the benchmarks of 0, $\frac{1}{2}$, 1 to compare fractions. MC 9-5
5. Students use unit fractions to name fractional parts of a set. MC 9-6
6. Students determine $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ of a small group.

Teacher note: Have the children represent a one- or two-digit number using interlocking cubes and determine if the cubes can be separated into two, three or four equal groups to make equal sized parts called $\frac{1}{2}$, $\frac{1}{3}$ or $\frac{1}{4}$. For example, separate 12 cubes into 2 equal groups. Show $\frac{1}{2}$ of 12 = 6. Separate 12 into three equal groups. Show $\frac{1}{3}$ of 12 = 4, etc

7. (Introduce) Students use fractions to name more than one part of a group. MC 9-7

Additional Activity:

- Have 6 students stand in the front of the room. Name the fractional part of the group that are girls, have brown hair, wearing sneakers, etc. Change the number of students to a larger or smaller group, and repeat.

Problem-solving strategies:

Students Draw a Picture to solve problems. MC 9-3

Post Assessment Unit 7

Grade 2 Mathematics

Electronic resources:

Illuminations: <http://illuminations.nctm.org/ActivityDetail.aspx?ID=73> – interactive concentration game with fractions

UNIT 7 VOCABULARY

equal parts, fraction, fractional part, group, part to whole, unit fraction

CMT CONNECTIONS

2B. Identify fractional parts of regions and sets using pictures and vice versa.

2C. Label and/or shade fractional parts of regions and sets.

Grade 2 Mathematics

Unit 8: Place Value (to 1,000) and Patterns

Pacing: SPRING (2-3 weeks)

In this unit, students read, write and compare numbers up to 1,000 and use patterns to solve problems.

Grade level expectations: The student will be able to:

2.1.1 Locate, label, compare, and order whole numbers up to 1,000 using pictures, place value models, number lines, and benchmarks of 0, 10 and 100, including naming the number that is 10 or 100 more or less than a given number.

2.1.2 Represent whole numbers up to 1,000 by modeling and writing numbers in expanded forms, e.g., $37 = (3 \times 10) + (7 \times 1)$, and regrouped forms, e.g., $(2 \times 10) + (17 \times 1) = 37$, and use the forms to support computational strategies.

2.1.8 Count whole numbers to 1,000 and beyond.

2.1.10 Read and write numerals up to 1,000.

2.1.11 Skip count by twos, fives, tens and hundreds to 1,000 and beyond.

Activities:

1. Students write numbers as hundreds, tens and ones . MC 10-1
2. Students read, write and use blocks to model numbers to 1,000. MC 10-2
3. Students use expanded form to write numbers. MC 10-4
4. Students read and write numbers through 1,000. MC 10-5

Additional activities:

- Give students one page of the thousands chart. Have children circle numbers as you give clues such as: Circle the number that means three hundreds, five tens and two ones, etc. See Thousands Chart in front folder.
 - Arrange benchmarks by 100s along a number line (number lines of 0-1,000). Give children cards with 3-digit numbers to place on the number line. There should be numerous whole class and individual opportunities for these activities.
5. (Introduce) Students compare 3-digit numbers using the symbols $<$, $>$, and $=$. MC 10-7
 6. Students use place value to order 3-digit numbers. MC 10-8
 7. Students use number patterns to find 1, 10 and 100 more or less. MC 10-9

Grade 2 Mathematics

Problem-solving strategies:

- a. Students Make a List to solve problems (combination problem). MC 10-3
- b. Students Act it Out or Draw a Picture to solve problems. MC 10-6

Post Assessment Unit 8

Electronic resources: www.mathwire.com

UNIT 8 VOCABULARY

expanded form, hundreds, ones, place value, tens

CMT CONNECTIONS

- 1B.** Identify alternative forms of expressing 3-digit whole numbers using expanded notation.
- 1C.** Identify alternative forms of expressing 2-digit whole numbers using regrouping.
- 1D.** Use place value concepts to identify and compare the magnitude and value of digits in two- and three-digit numbers.
- 2A.** Relate whole numbers to pictorial representations of base ten blocks and vice versa.
- 4A.** Order two- and three-digit whole numbers
- 4B.** Describe magnitude of two- and three-digit whole numbers.
- 4C.** Round two-digit whole numbers in context.

Unit 9: Geometry

Pacing: SPRING (3 weeks)

In this unit, students identify, describe and draw 2D and 3D figures.

Grade level expectations: The student will be able to:

3.1.1 Identify, describe and draw polygons (triangles, quadrilaterals including trapezoids and rhombuses, pentagons and hexagons), solids, and other familiar two- and three- dimensional objects in the environment.

3.1.2 Compare and sort familiar polygons, solids, and other two- and three- dimensional objects in the environment.

3.1.3 Construct polygons, solids and other two- and three-dimensional objects using a variety of materials and create two-dimensional shapes and designs with one or more lines of reflective symmetry (lines that divide the shape or design into two congruent parts).

3.1.4 Investigate and predict the result of putting together and taking apart two- and three-dimensional shapes in the environment, e.g. use objects to find other shapes that can be made from three triangles or a rectangle and a triangle.

Activities:

Teacher note: may begin with 2D shapes first.

1. Students identify 3D shapes. MC 11-1

Teacher note: have students find these shapes in the school environment.

2. (Introduce terms faces, edges and vertices.) Students describe 3D figures using faces, edges and vertices. MC 11-2

3. Students identify 2D figures. MC 11-3

4. Students describe 2D figures using sides and vertices. MC 11-5

Additional activity: Have the children draw a polygon and write the name on a page in their math journals. The children should then find pictures of objects that closely resemble the polygons they have drawn and named, and paste the pictures on the appropriate page of the journal. Children should explain the reason for pasting the picture on that page in writing. Magazines can be used to find pictures, such as stop signs that are octagons or rectangular candy bars.

5. Students create patterns with reflective symmetry.

Alternate activities:

- Have children look for examples of congruent figures in the environment. Have children copy shapes on geoboards and then subdivide the shapes into two symmetrical pieces or congruent parts if possible. Children can then sort shapes and objects by whether they have symmetry and/or congruence.
- Children can explore letters of the alphabet and numerals to see if they have lines of symmetry.
- See appendix for “Pattern Extension Activities”, focusing on reflective (or bilateral) symmetry.

Grade 2 Mathematics

6. Students compare and sort 2D and 3D shapes. MC 11-6

Alternate activities:

- A collection of activities for 2D and 3D shapes can be found in the appendix, “Two and Three Dimensional Riddles.”
- Have the children sort a set of pattern blocks, storage containers or geometric solids and explain the reason for the sort. For example: I separated the sphere from all the other solids because the sphere is round and the other shapes have straight, flat sides. Ask the children to find more than one way to sort the figures.
- Students build models of 2D and 3D shapes and compare them using a Venn diagram. “Geo-Panes” See appendix

7. Students put figures together to make new figures. MC 11-7

Alternate activity: Give the children an outline of an irregular shape, which can be constructed from pattern block or tangram templates, and have them fill in the outline using actual pattern block or tangram pieces.

8. Students locate points on a number line. MC 11-9

9. (Extend) Students use a coordinate graph to locate objects. MC 11-10

Alternate activities:

- Students combine graphing skills and money in a game “Clean Up the Money!” See appendix.
- www.mathwire.com/goemetry/ccordgeom.html for additional activities.

Problem-solving strategies:

- a. Students Look for a Pattern to solve a problem. MC 11-4
- b. Students use Guess and Check to solve a problem. MC 11-8

Post Assessment Unit 9

Electronic resources:

Illustrations: <http://illuminations.nctm.org/LessonsList.aspx?grade=1&standard=3&srchstr=tangrams> three lessons provided on: Recognizing, Constructing, and Identifying Triangles, Using Tangram Puzzles to Explore Spatial Relationships, and Developing Geometric Understanding and Spatial Visualization Skills

UNIT 9 VOCABULARY

congruent, hexagon, line of symmetry, pentagon, polygon, quadrilateral, rectangle, rhombus, sort, square, symmetry, trapezoid, triangle, sphere, cylinder, cone, cube, rectangular prism

CMT CONNECTIONS

17A. Identify and recognize two-dimensional geometric shapes and figures, including number of angles and sides of polygons.

17B. Draw two-dimensional geometric shapes and figures.

25A. Solve extended numerical and statistical problems.

Grade 2 Mathematics

Unit 10: Measurement

Pacing: SPRING (3 weeks)

In this unit, students estimate and measure length, area, capacity, weight, temperature and volume.

Grade level expectations: The student will be able to:

3.3.7 Use measurement tools such as thermometers to measure temperature, basic rulers to measure length to the nearest half-inch or centimeter, and balance scales to measure weight /mass in grams.

3.3.8 Use nonstandard referents and standard benchmarks to estimate and measure the following:

- length(to the nearest inch, half-inch, foot, yard, centimeter or meter);
- area (in square inches);
- capacity (in liters and cups);
- weight (in grams);
- temperature; and
- volume (using water or sand).

3.3.9 Describe the strategy used to determine an estimate and determine if the estimate is reasonable.

3.3.10 Describe the relationships between and centimeter and meter among inch, foot and yard.

Teacher note: This unit may be integrated with the Grade 2 Science Unit on Properties of Matter.

Activities:

1. Students measure length with nonstandard units. MC 12-1

Alternate activity: Students measure and categorize objects in the classroom. “Measuring Our Classroom” See appendix.

2. Students use models to measure length in inches. MC 12-2

3. Students estimate and measure length using an inch ruler. MC 12-4

Teacher note:

- Have the children discover common referents in everyday objects by comparing them with measuring tools, such as small paper clip is about one gram, width of a finger is about 1 centimeter, height from the floor to the knob on the door about 1 meter, etc.
- Have students describe the relationship among inch, foot and yard.

4. Students use models to measure length in centimeters. MC 12-5

Grade 2 Mathematics

5. Students estimate and measure using a centimeter ruler. MC 12-6

Teacher notes:

- Have students describe the relationship between a centimeter and a meter.
- Have students work with approximation of length activities. See appendix BARB

6. Students use models to find area. MC 12-7

Alternate activity: Give the children numerous opportunities to estimate the number of square tiles or Unifix cubes that it will take to cover • different sized rectangles such as books, writing paper or construction paper.

7. Students use nonstandard units to measure capacity. MC 13-1

Alternate activity: Provide a collection of labeled containers. Mark one container as the target and have the children sort the rest of the collection into those that hold more than, less than or about the same amount as the target container. Provide an organizer for the children to record their results. Next, have the children verify their choices by providing a filler, such as rice or beans. Avoid giving explicit instructions or directions, but later discuss the children's ideas and actions for proving which containers were more, less or about the same as the target container.

8. Students estimate and measure capacity using cups. MC 13-2

Teacher note: the focus is on cups and liters.

9. Students estimate and measure capacity using milliliters and liters. MC 13-4

Teacher note: the focus is on liters. Students should associate milliliter with a very small amount.

10. Students use nonstandard units to find weight. MC 13-5

Alternate activities:

- Provide a variety of experiences weighing objects. Use balances to compare weights and understand equality, such as find out how many pennies balance a small familiar object.
- Use balances or scales with gram weight to assign a numerical value to the weight of an object.

11. (Extend) Students estimate and measure weight using ounces and pounds. MC 13-6

12. Students estimate and measure mass in grams and kilograms. MC 13-7

Teacher note: focus is on grams.

Problem-solving strategies:

- a. Students Make a Table to solve problems. MC 12-8
- b. Students Act it Out to solve problems. MC 13-3

Post Assessment Unit 10

Grade 2 Mathematics

Electronic resources:

Tour of Measurement: <http://www.mathforum.org>

Can You Measure Up? <http://artsedge.kennedy-center.org/content/3801>

UNIT 10 VOCABULARY

area, capacity, centimeter, cup, foot, gram, half-inch, inch, length, liter, meter, ruler, yard, weight

CMT CONNECTIONS

15A. Estimate lengths and areas by comparing.

16A. Measure lengths to the nearest inch or centimeter.

16B. Draw lengths to the nearest inch or centimeter.

16C. Identify appropriate customary or metric units of measure for a given situation (inches, feet, centimeters and meters).

25A. Solve extended numerical and statistical problems.

Grade 2 Mathematics

Unit 11: Computation (addition and subtraction) with larger numbers

Pacing: SPRING (2 weeks)

In this unit, students apply knowledge of addition and subtraction of two-digit numbers to three-digit numbers.

Grade level expectations: The student will be able to:

2.1.13 Create word problems and write and solve two- and three-digit number sentences that reflect contextual situations and real-world experiences involving addition and subtraction. Construct and solve open sentences, e.g., $\square + 5 = 11$. Solve the problems using a variety of methods including models, pictures, pencil and paper, estimation and mental computation, and describe the reasoning or strategies used.

2.1.16 Determine when an estimate for a problem involving two- and three-digit numbers is appropriate or when an exact answer is needed.

2.1.17 Use a variety of strategies to estimate solutions and to determine if a solution to a computation or word problem reflecting real-world experiences involving addition and subtraction of two- and three-digit whole numbers is reasonable

Activities:

1. (Introduce) Students use models to subtract with regrouping. MC 6-3
2. (Introduce) Students use models to subtract two-digit numbers. MC 6-6
3. (Introduce) Students estimate differences by rounding, then use calculators to find the exact answer. MC 6-9
4. Students add hundreds. MC 14-1
5. (Introduce) Students find the sum of three-digit numbers, regrouping ones. MC 14-2
6. (Introduce) Students regroup tens of add three-digit numbers. MC 14-3
7. (Introduce) Students estimate sums of three-digit numbers. MC 14-5
8. (Introduce) Students subtract hundreds. MC 14-6

Grade 2 Mathematics

9. Students determine situations when an estimate for a problem is appropriate or when an exact answer is needed.

Teacher note:

Complete a T chart similar to the one below. Add other situations to the chart.

Estimate	Exact
Buying 2 books at the book fair. I have \$5. Do I have enough money?	How many birthday treats do I need for my classmates?
How long will it take me to walk from the classroom to the gym?	I want to get an ice cream for lunch. How much money do I need?

Grade 2 Mathematics

Unit 12: Multiplication and Division

Pacing: SPRING (2 weeks)

In this unit, students relate addition and subtraction skills to multiplication and division concepts.

Grade level expectations: The student will be able to:

2.1.3 Represent multiplication and division (with factors of 1, 2, 5 and 10) using a variety of models and strategies such as arrays, pictures, skip counting, extending number patterns, and repeated addition and subtraction and describe the connection between multiplication and division.

Activities:

1. (Introduce) Students model multiplication stories. MC 15-1
2. (Introduce) Students use skip counting to find the total in equal groups. MC 15-2
3. (Introduce) Students use repeated addition to solve multiplication problems. MC 15-4
4. (Introduce) Students use arrays to model multiplication MC 15-5
5. (Introduce) Students model division stories. MC 15-6
6. (Introduce) Students divide to make equal groups. MC 15-7
7. (Introduce) Students use repeated subtraction to divide. LA3