Grade 2 Mathematics

Transitional Curriculum

REVISED 2012

LOUISIANA DEPARTMENT OF EDUCATION
# Grade 2 Mathematics

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2012 Louisiana Transitional Comprehensive Curriculum
Course Introduction

The Louisiana Department of Education issued the first version of the Comprehensive Curriculum in 2005. The 2012 Louisiana Transitional Comprehensive Curriculum is aligned with Grade-Level Expectations (GLEs) and Common Core State Standards (CCSS) as outlined in the 2012-13 and 2013-14 Curriculum and Assessment Summaries posted at http://www.louisianaschools.net/topics/gle.html. The Louisiana Transitional Comprehensive Curriculum is designed to assist with the transition from using GLEs to full implementation of the CCSS beginning the school year 2014-15.

Organizational Structure
The curriculum is organized into coherent, time-bound units with sample activities and classroom assessments to guide teaching and learning. Unless otherwise indicated, activities in the curriculum are to be taught in 2012-13 and continued through 2013-14. Activities labeled as 2013-14 align with new CCSS content that are to be implemented in 2013-14 and may be skipped in 2012-13 without interrupting the flow or sequence of the activities within a unit. New CCSS to be implemented in 2014-15 are not included in activities in this document.

Implementation of Activities in the Classroom
Incorporation of activities into lesson plans is critical to the successful implementation of the Louisiana Transitional Comprehensive Curriculum. Lesson plans should be designed to introduce students to one or more of the activities, to provide background information and follow-up, and to prepare students for success in mastering the CCSS associated with the activities. Lesson plans should address individual needs of students and should include processes for re-teaching concepts or skills for students who need additional instruction. Appropriate accommodations must be made for students with disabilities.

Features
Content Area Literacy Strategies are an integral part of approximately one-third of the activities. Strategy names are italicized. The link (view literacy strategy descriptions) opens a document containing detailed descriptions and examples of the literacy strategies. This document can also be accessed directly at http://www.louisianaschools.net/lde/uploads/11056.doc.

Underlined standard numbers on the title line of an activity indicate that the content of the standards is a focus in the activity. Other standards listed are included, but not the primary content emphasis.

A Materials List is provided for each activity and Blackline Masters (BLMs) are provided to assist in the delivery of activities or to assess student learning. A separate Blackline Master document is provided for the course.

The Access Guide to the Comprehensive Curriculum is an online database of suggested strategies, accommodations, assistive technology, and assessment options that may provide greater access to the curriculum activities. This guide is currently being updated to align with the CCSS. Click on the Access Guide icon found on the first page of each unit or access the guide directly at http://sda.doe.louisiana.gov/AccessGuide.
Time Frame: Approximately five weeks

Unit Description

This unit focuses on addition and subtraction problems using basic addition and subtraction facts.

Student Understandings

Students use basic addition and subtraction facts to help them solve real-life problems. They recognize when a situation calls for addition or subtraction and use facts and related fact families to solve such settings. Students write number sentences using the correct symbols. Students create picture graphs and bar graphs and solve simple problems using information presented in the graphs.

Guiding Questions

1. Can students perform all addition and subtraction facts through 10 + 10 with ease and apply related fact families?
2. Can students apply facts to solve real-life problems?
3. Can students use appropriate symbolism for operations and number sentences?
4. Can students use number sentences to model problems and find missing values in fact-related equations?
5. Can students represent data in picture graphs and bar graphs using a single-unit scale and solve simple addition and subtraction problems using information presented in a bar graph?

Unit 1 Grade-Level Expectations (GLEs) and Common Core State Standards (CCSS)

<table>
<thead>
<tr>
<th>Grade-Level Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLE #</td>
</tr>
<tr>
<td><strong>Number and Number Relations</strong></td>
</tr>
<tr>
<td>7.</td>
</tr>
<tr>
<td>8.</td>
</tr>
<tr>
<td>9.</td>
</tr>
<tr>
<td><strong>Algebra</strong></td>
</tr>
<tr>
<td>12.</td>
</tr>
</tbody>
</table>
13. Find the missing number in an equation involving addition or subtraction (e.g., \( \# + 4 = 7 \), \( 8 - \# = 3 \)) (A-2-E) (N-4-E)

<table>
<thead>
<tr>
<th>CCSS #</th>
<th>CCSS Text</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CCSS for Mathematical Content</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Operations and Algebraic Thinking</strong></td>
<td></td>
</tr>
<tr>
<td>2.OA.3</td>
<td>Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.</td>
</tr>
<tr>
<td><strong>Number and Operations in Base Ten</strong></td>
<td></td>
</tr>
<tr>
<td>2.NBT.9</td>
<td>Explain why addition and subtraction strategies work, using place value and properties of operations.</td>
</tr>
<tr>
<td><strong>Measurement and Data</strong></td>
<td></td>
</tr>
<tr>
<td>2.MD.6</td>
<td>Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, … , and represent whole-number sums and differences within 100 on a number line diagram.</td>
</tr>
<tr>
<td>2.MD.10</td>
<td>Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.</td>
</tr>
<tr>
<td><strong>ELA CCSS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Reading Standards for Informational Text</strong></td>
<td></td>
</tr>
<tr>
<td>RI.2.1</td>
<td>Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.</td>
</tr>
<tr>
<td><strong>Writing Standards</strong></td>
<td></td>
</tr>
<tr>
<td>W.2.2</td>
<td>Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.</td>
</tr>
<tr>
<td>W.2.8</td>
<td>Recall information from experiences or gather information from provided sources to answer a question.</td>
</tr>
<tr>
<td><strong>Speaking and Listening Standards</strong></td>
<td></td>
</tr>
<tr>
<td>SL.2.1</td>
<td>Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.</td>
</tr>
<tr>
<td>a.</td>
<td>Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).</td>
</tr>
<tr>
<td>b.</td>
<td>Build on others’ talk in conversations by linking their comments to the remarks of others.</td>
</tr>
<tr>
<td>c.</td>
<td>Ask for clarification and further explanation as needed about the topics and texts under discussion.</td>
</tr>
</tbody>
</table>
Sample Activities

Activity 1: Addition Sentences (GLEs: 7, 8, 9, 12; CCSS: W.2.2)

Materials List: red and blue cubes, chart paper, markers, index cards with hole punched in one corner, 20 two-color counters per student, math learning log, binder rings or piece of string per student, Double Ten-Frame BLM, Common Addition and Subtraction Situations BLM (teacher reference)

The purpose of this activity is to review basic concepts of the “add to” and “put together” addition situations. Refer to the Common Addition and Subtraction Situations BLM for an explanation of the various types of problem situations.

Show the students a tower of 8 red cubes. Put two blue cubes on the tower. Ask the students to tell how many cubes are on the tower now. (This type of problem models an “Add to – Result Unknown” addition situation.)

At the top of a piece of chart paper, write the word ADD in large letters. Review with the students how to write an addition number sentence. Discuss with students that the + sign is used to show the two numbers that are added together. The equal sign means “is the same as.” Write the following statements on the chart paper and draw an example to represent the “Add to” addition situation:

\[
\begin{align*}
\text{“Add to”} \\
\text{start plus more = new total} \\
8 \text{ cubes and 2 cubes is the same as 10 cubes in all} \\
8 \text{ cubes} + 2 \text{ cubes} = 10 \text{ cubes}
\end{align*}
\]

Show students a cube tower with 7 red cubes and a cube tower with 3 blue cubes. Ask the students to answer the following question: “Here are two cube towers. This cube tower has 7 red cubes and this cube tower has 3 blue cubes. How many cubes will be in the tower if you put the two towers together?” (This type of problem models a “Put Together – Total Unknown” addition situation.)

Explain that an addition sentence can be written to show the part-part-total relationship. Write the following statements and draw an example to represent the “Put Together” addition situation.
“Put Together”

part plus part = total

7 red cubes and 3 blue cubes is the same as 10 cubes altogether
7 red cubes + 3 blue cubes = 10 cubes

*Color the drawing of the cubes red and blue for a more visual representation.

Demonstrate for students that the number sentence can be written with the total on the left side of the equal sign and the addends on the right side of the equal sign as follows:

10 cubes is the same as 7 cubes and 3 cubes
10 = 7 + 3

*NOTE: This activity uses ten frames. To make effective use of a ten frame and to promote visualization by the students, always fill a ten frame beginning in the upper left hand corner and across the row to fill five. Then proceed to the next row, beginning in the left corner and then across to complete the ten.

Provide each student with a Double Ten-Frame BLM and 20 two-color counters. Have the students pick up some counters, shake them in their hands and drop them on the table. Instruct the students to separate the counters by color and organize them on the Double Ten-Frame. As students fill the double ten-frame, have them start from the top and fill the row from left to right using the first color of counters and then switching to the second color. Students should continue filling the next row left to right. Have students continue filling the second frame the same way until all of the counters that were used have been placed on the frame. Have the students write an addition sentence for their counters to show the two colors being added together. The students should repeat the activity five more times using a different total of counters each time. For the last 3 addition sentences, students should write the total to the left of the equal sign and the addends to the right.

Introduce the following math vocabulary words to the students: total, part, addend, sum, addition sentence, plus sign and equal sign. Have the students create vocabulary cards (view literacy strategy descriptions) for each of the words. Vocabulary cards are used to help students develop their understanding for content-specific terminology. The cards offer students the opportunity to internalize the identified words by developing a student-friendly definition and connecting it to examples, illustrations and properties or characteristics of the word. Provide the students with 3×5 index cards. Model how to set up the cards by creating an example on the board. In the center of the card, write the word the students are to define. Discuss the meaning of the word and create a definition as a class. Provide an example of the word for the students, but allow them to create their own example if they choose. Each card should resemble the following sample card:
What does it mean?  
A number that is added to another number in an addition sentence.

When do I use it?  
Found in addition problems.

<table>
<thead>
<tr>
<th>addend</th>
<th>Illustration:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 + 4 = 7</td>
<td>(draw a picture that represents the word)</td>
</tr>
</tbody>
</table>

After the students have created their cards, punch a hole in the top left corner. Provide a string or a binder ring for the students to store their cards. If using a string, be sure it is long enough to tie a bow so that the students will be able to untie it to add new cards throughout the year. Consider having students alphabetize the cards and color-code them based on the concepts to which they relate by making a dot on one corner (red dot for addition & subtraction, green dot for place value, blue dot for measurement, etc.). This will allow easy reference for review as concepts are added and expanded throughout the year. The students should use the vocabulary cards to review terms and concepts before a test. They may use them as flash cards to quiz a friend or themselves. Students should also refer to the cards when writing explanations for math problems or concepts.

Ask students to write $5 + 6 = 11$ in their math learning logs (view literacy strategy descriptions). A math learning log is a notebook or binder that will be kept by the students throughout the year to summarize new content learned, record questions and reflections, and solve and explain mathematical problems. As students record ideas in their learning logs, they are required to think more deeply about the information they have learned and are asked to explain it in their own words. The students should date the pages of their learning logs and include the prompt or questions to be addressed. This will allow easy reference when entries need to be reviewed. For the number sentence $5 + 6 = 11$, the students should identify the addends, addition sign, and sum. The students should explain in words or pictures what it means to add the two numbers to find the sum. Provide a set amount of time for the students to write in their learning logs and allow them to share entries with partners, in small groups, or with the entire class. Learning logs are a great way to track the students’ progress and can provide information about where misconceptions may occur for students.

Activity 2: Commutative Property of Addition (GLEs: 7, 8, 12; CCSS: 2.NBT.9, W.2.2, SL.2.1a-c)

Materials List: 10 cubes, 2 colors of linking cubes, math learning logs

Show students the same set of cubes ($8 + 2 = 10$) from Activity 1. Demonstrate the commutative property of addition by rearranging the cubes so that there are 2 cubes in the
first pile and 8 cubes in the second pile. Write the addition sentence, 2 cubes + 8 cubes = 10 cubes, on the board. Ask the students if the total number of cubes has changed.

Repeat the process for $4 + 3 = 7$ and $3 + 4 = 7$, $9 = 6 + 3$ and $9 = 3 + 6$, and $7 = 5 + 2$ and $7 = 2 + 5$. Guide students to the conclusion that the order in which the numbers (addends) are added does not affect the total number of books (sum). Explain that it doesn’t matter which part is used to start with – when the two parts are put together, the total is still the same. The students should create a vocabulary card (view literacy strategy descriptions) for commutative property and add it to the set of cards introduced in Activity 1.

Use an “Inside-Outside-Circle” discussion (view literacy strategy descriptions) to provide additional practice with the commutative property. Discussion strategies provide students an opportunity to verbalize and deepen their understanding of concepts. For “Inside-Outside-Circle,” students should stand in two concentric circles facing a partner. The students in the inside circle should face outward, and the students in the outside circle should face in. Provide the students in the inside circle with various numbers of linking cubes (no more than 9) of a single color and instruct them to link their cubes to make a cube train. Provide each student in the outside circle with various numbers of linking cubes (no more than 9) of a different color and have them link their cubes to make a cube train. Instruct the inside-outside partners to link their cube trains together and discuss the 2 addition sentences that can be used to represent the cubes. After the partners have identified and discussed the two addition sentences, each student will take back his/her original cubes. Ask the inside circle to rotate to the right until “stop” is said. Each student should be facing a new partner and will discuss the new addition sentences that can be made by linking their cube trains together. Repeat the rotation process again, this time allowing the outside circle to rotate. After each rotation, randomly ask individual students to share the addition sentences for their cubes and to explain how the commutative property works.

After the final rotation, have the students illustrate one of the cube trains that they created with a partner in their learning logs (view literacy strategy descriptions) and write the two addition sentences with the total on the right and two addition sentences with the total on the left. The students should also explain how the commutative property of addition works and how it will help them learn addition facts.

**Activity 3: Addition Strategies (GLE: 7, 9; CCSS: 2.NBT.9, W.2.8)**

Materials List: pictures of tools, 8 index cards per student, pencils, small mailing envelopes, markers or crayons, chart paper, fact practice sheets, flash cards (or index cards to create flash cards), math learning logs

Display pictures of tools (such as a hammer, a saw, a drill, a ruler, and a screwdriver). Have students identify which tool could be used to cut a board, make a hole, or pound a nail. Explain that each tool helps a carpenter complete a job quickly and accurately. Present the idea that a mathematician also uses tools to help add and subtract quickly.
These tools are called strategies. The strategies are used as a bridge to memorization. As students become more proficient with the strategies, they should begin to develop memorization of the basic facts.

Present addition strategies to students allowing 1 to 2 days for students to practice and internalize each strategy. Second grade students may know some of these strategies already as many are introduced in the first grade. Review the strategies that students already know and spend more time developing proficiency with the higher level strategies. The students will create modified vocabulary cards (view literacy strategy descriptions) for each of the addition strategies. Vocabulary cards allow students to develop their understanding of the addition strategies as they are introduced. These vocabulary cards have been modified by dividing the card into 3 sections instead of four. Provide each student with 8 index cards.

Model how to create a vocabulary card for the students. Draw a large representation of the vocabulary card on the board. In the center of the card, direct students to write the name of the addition strategy. On the top left, the students will explain the addition strategy using their own words. On the bottom left, students will write a “hint” to help them remember the addition strategy. A hint might be a rhyme, picture, or memory trick from the information below. On the right side of the card, the students will list as many facts as they can that relate to the addition strategy. Have students store their cards in an envelope labeled “______’s Math Fact Tools.” Students may decorate the envelope to resemble a toolbox. Throughout the unit, provide opportunities for students to review their cards and practice their facts. Students may wish to add more facts to the right side of the card as they continue to develop an understanding of each addition strategy and its corresponding facts. As students develop memorization of the facts for each addition strategy, have them mark the back side of the card with a smiley face or sticker.

Example:

<table>
<thead>
<tr>
<th>Explanation:</th>
<th>Examples:</th>
</tr>
</thead>
<tbody>
<tr>
<td>When you add zero the number stays the same</td>
<td>0+1  1+0</td>
</tr>
<tr>
<td>Hint: Zero’s the game, number stays the same!</td>
<td>2+0  0+5  3+0</td>
</tr>
<tr>
<td>Zero Facts</td>
<td>0+2  0+7</td>
</tr>
</tbody>
</table>
Following are some suggested addition strategies and their corresponding facts.

- **ZERO FACTS**: Zero’s the game, number’s the same!
  
  1+0 2+0 3+0 4+0 5+0 6+0 7+0 8+0 9+0

  - Present the numeral zero as “Zero the Hero.” Just like any superhero, his job is to save the day. Zero the Hero saves the number! When you add Zero the Hero to a number, the number is safe; the answer is the same as the number being added!
  - This strategy is known as the additive identity property of 0. When zero is added to a number, the number remains the same.

- **COUNT ON**: See a 1, 2, or 3? Grab the big number and count on.
  
  9+3 8+3 7+3 6+3 5+3 4+3 3+3 2+3 1+3
  
  9+2 8+2 7+2 6+2 5+2 4+2 3+2 2+2 1+2
  
  9+1 8+1 7+1 6+1 5+1 4+1 3+1 2+1 1+1

  - Sing the following song to the tune of “Alice the Camel”:
    
    Grab the bigger number and count on.
    Grab the bigger number and count on.
    Grab the bigger number and count on.
    You can count on 1, 2, 3.

  - The commutative property of addition should be emphasized with this strategy. Numbers can be added in any order; therefore, it does not matter whether the larger number is first or second in the problem.

- **DOUBLES**: A double? No trouble! Think of the picture to help.

<table>
<thead>
<tr>
<th>Big Rig</th>
<th>Crayon Box</th>
<th>2 weeks</th>
<th>Egg Carton</th>
</tr>
</thead>
<tbody>
<tr>
<td>9+9</td>
<td>8+8</td>
<td>7+7</td>
<td>6+6</td>
</tr>
<tr>
<td>Fingers</td>
<td>Spider Legs</td>
<td>Soda Cans</td>
<td>Car Wheels</td>
</tr>
<tr>
<td>5+5</td>
<td>4+4</td>
<td>3+3</td>
<td>2+2</td>
</tr>
<tr>
<td>Eyes</td>
<td></td>
<td></td>
<td>1+1</td>
</tr>
</tbody>
</table>

  - Create a chart with the students to relate the picture, addition fact, and sum.

<table>
<thead>
<tr>
<th>Double</th>
<th>Question</th>
<th>Picture</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>9+9</td>
<td>How many wheels on a big-rig truck?</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>8+8</td>
<td>How many crayons in a box?</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>7+7</td>
<td>How many days in 2 weeks?</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>6+6</td>
<td>How many eggs in a carton?</td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

- **DOUBLES+1**: When the numbers are next to each other on a number line, double the smaller number and add 1 more.

  | 2+1    | 3+2 | 4+3 | 5+4 | 6+5 | 7+6 | 8+7 | 9+8 | Example: 4 + 5 |
  | 1+2    | 2+3 | 3+4 | 4+5 | 5+6 | 6+7 | 7+8 | 8+9 | 4 + 4+1        |

Grade 2 Mathematics ◊ Unit 1 ◊ Facts for Life 1-8
Note: The use of ten frames can help students better understand the following strategies.

- **TEN PARTNERS**: Think of the 10-frame. What makes a 10?
  
<table>
<thead>
<tr>
<th>1+9</th>
<th>2+8</th>
<th>3+7</th>
<th>4+6</th>
<th>5+5</th>
<th>6+4</th>
<th>7+3</th>
<th>8+2</th>
<th>9+1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

  - Teach the students this cheer:
    
    I say 9, you say 1. 9…1…Ten for fun!
    I say 8, you say 2. 8…2…Ten for you!
    I say 7, you say 3. 7…3…Ten for me!
    I say 6, you say 4. 6…4…Ten some more!
    I say 5, you say 5. 5…5…Ten alive!
    I say 0, you say 10. 0…10…Ten again!

    - Ten again! Ten AGAIN!

- **FAST 10**: The smaller number takes the place of the zero.
  
<table>
<thead>
<tr>
<th>10+9</th>
<th>10+8</th>
<th>10+7</th>
<th>10+6</th>
<th>10+5</th>
<th>10+4</th>
<th>10+3</th>
<th>10+2</th>
<th>10+1</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

- **NAUGHTY 9**: 9 steals one from the smaller number and makes a 10.
  
<table>
<thead>
<tr>
<th>9+8</th>
<th>9+7</th>
<th>9+6</th>
<th>9+5</th>
<th>9+4</th>
<th>9+3</th>
<th>9+2</th>
<th>Example: 9 + 5 =</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9 + (1 + 4) = 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(9 + 1) + 4 = 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10 + 4 = 14</td>
</tr>
</tbody>
</table>

- **ADDING 8 & 7**: 8 takes 2; 7 takes 3
  
<table>
<thead>
<tr>
<th>8+4</th>
<th>8+5</th>
<th>8+6</th>
<th>Example: 8 + 6 =</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8 + (2 + 4) = 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(8 + 2) + 4 = 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 + 4 = 14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7+4</th>
<th>7+5</th>
<th>Example: 7 + 5 =</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>7</td>
<td>7 + (3 + 2) = 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(7 + 3) + 2 = 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 + 2 = 12</td>
</tr>
</tbody>
</table>

Note: This addition strategy is related to the “Naughty 9” addition strategy. Students should have a firm understanding for the Naughty 9 strategy before introducing the Adding 7 & 8 strategy. These strategies can be modeled using the associative property of addition.

After teaching all of the strategies, have the students reflect on the addition strategies in their math learning logs (view literacy strategy descriptions) by answering the following questions:

- Which addition strategy has helped me the most?
- What are some facts I have learned by using this strategy?
- What is the most important thing to remember about this strategy?
- How has this strategy made it easier to add two numbers?
Allow students to share their responses in groups of four. The students should recognize how the different addition strategies have helped them in different ways.

Activity 4: Even or Odd Race (CCSS: 2.OA.3)

Materials List: linking cubes, chart paper, bags of 20 linking cubes, paper clips, Even or Odd Game Board BLM, Even or Odd Spinner BLM, Even or Odd Mat BLM, color tiles, index cards

This activity should be completed after students have been taught the Doubles Addition Strategy described in Activity 3.

Divide the class into pairs. Give each pair of students an amount of linking cubes from 2 to 20. Have each pair of students decide whether their amount of cubes can be used to demonstrate a “Doubles” addition fact. Observe as the students complete their investigation and then have them record their total number of cubes on a two-column chart labeled “Doubles” and “Not Doubles.” When all numbers have been recorded, ask students to share how they found whether their cubes could be used to demonstrate doubles. Record the doubles facts for each of the doubles sums.

Write the words even and odd on the board. Explain that there are even numbers and odd numbers. Discuss that an even number is a number that can be divided into two equal addends and can be shown using a doubles fact. Numbers that cannot be divided into two equal groups are odd numbers. Give each pair of students an Even or Odd Game Board BLM, an Even or Odd Mat BLM, and an Even or Odd Spinner BLM, a paper clip, and a bag of 20 linking cubes. Provide each student with a different colored tile (or other object to use as a game piece). Have each student place his or her game piece on a game board space marked “START.” Have students take turns spinning the spinner and showing the number of cubes on the Even or Odd Mat. Have students align the cubes on the mat in two columns to decide if the number is even or odd. If the number is even, the student will state the doubles fact that represents the even number and then move his/her game piece to the next space marked “even” on the game board. If the number is odd, the student will move his/her game piece to the next space marked “odd” on the game board. The game ends when a student reaches the “WIN” space with an even or odd move.

Record the words even and odd on vocabulary cards (view literacy strategy descriptions) and add the cards to the vocabulary cards started in Activity 1.

Activity 5: An Even Share (CCSS: 2.OA.3)

Materials List: 4 bags of candy containing even and odd numbers of pieces, Even or Odd Story Problem BLM, Scoot BLM, math learning logs, dry erase boards, dry erase markers, bags of linking cubes
Show students a bag of candy and select two students to come to the front of the class. Ask the class to share ways to find out if the candy can be shared evenly between the two students. Students may suggest to count the total number of pieces to see if it is a “doubles” number. Use the “one for you, one for me” alternating method to pass out the candy and count to see if they get the same number of pieces, etc. Use the suggested methods to model counting and distributing the candy. Have the students tell if the bag had an even or odd number of pieces. Repeat with other bags and other student volunteers.

Give each pair of students a Scoot BLM. Cut apart the Even or Odd Story Problem BLM into separate cards. Set up “Scoot Stations” by laying the story problem cards on desks throughout the room along with a dry erase board, marker, eraser, and bags of linking cubes. Be sure to set up the stations in order so that students will be able to easily find and move to the next station. Before playing the game, have students practice moving from station to station a couple of times.

To play Scoot, have each pair of students stand next to a story problem card. Give a signal for the students to start. Have the students read the story problem card and use the manipulatives or dry erase boards to determine the answer to the problem. Have the students record their answer on the Scoot BLM in the box with the corresponding problem number (i.e., if the partners are at station 5, they will record their answer in box 5). After recording their answer, have the students reset the materials for the next group. When all groups have completed, call out “SCOOT!” and have students move to the next station (i.e., students at station 5 move to station 6, students at the last station will move to station 1). Have students move from station to station, reading the problem and answering it on the Scoot BLM. After the students have rotated through all of the stations, review the answers together as a class. Ask pairs to share how they found the answer to the problem.

Display the following problems:

- Alia had 18 cookies to share evenly with her sister. Can she share them evenly? How many will they each get? Will there be any left over? Is 18 an even or odd number? How do you know?

- Ashlyn had 13 pieces of candy to share with her friend. Can she share them evenly? How many will they each get? Will there be any left over? Is 13 an even or odd number? How do you know?

Have students write the problems in their math learning logs (view literacy strategy descriptions) find the answers, and then explain how they found their answers. Students should include a doubles fact to show that the first problem has an even number of objects. For the second problem, students should explain that there was one extra, so it is an odd number.
Activity 6: Subtracting (GLEs: 7, 8, 9, 12)

Materials List: Common Addition and Subtraction Situations BLM (teacher reference), red and blue connecting cubes, Subtracting BLM, paper, pencil

The purpose of this activity is to review basic concepts of the “take from” and “take apart” subtraction situations. Refer to the Common Addition and Subtraction BLM for an explanation of the various types of problem situations.

Show a tower of 10 cubes. Remove 2 cubes from the tower (this type of problem models a “Take from – Result Unknown” situation). Ask students to identify the operation being modeled when they have a total amount and then take something away.

At the top of a piece of chart paper, write the word SUBTRACT in large letters. Review with the students how to write a subtraction number sentence. Write the following statements on the chart paper and draw an example to represent the “Take from” subtraction situation:

“Take From”
total take away some = amount left
10 cubes – 2 cubes = 8 cubes

Make a cube tower that has 7 red cubes and 3 blue cubes. Ask the students to answer the following question: “My tower has 10 cubes. 7 of them are red. How many are blue?” (This type of problem models a “Take Apart – Addend Unknown” problem situation.) Explain that a subtraction sentence can be written to show the part-part-whole relationship. Write the following statements and draw an example to represent the “Take Apart” subtraction situation.

“Take Apart”
whole minus one part = the other part
10 cubes – 7 red cubes = 3 blue cubes

*Color the drawing of the cubes red and blue for a more visual representation.
Give each student a set of 10 red and 10 blue cubes and a Subtracting BLM. Have him/her model the subtraction problems using the cubes to find the solution. Have the student draw a picture of the problem and write a subtraction number sentence to show the solution.
The students will add new cards for subtrahend, minuend, difference and minus sign to the vocabulary cards (view literacy strategy descriptions) that were created in Activity 1.

**Activity 7: Number Line Subtraction (GLEs: 7, 8, 9, 12; CCSS: 2.MD.6)**

Materials List: masking tape, chalk, paper, pencil, Number Line Stories BLM,

Make a large number line on the floor with masking tape and chalk. Number the line 0 through 20. Have one student start at 0 and walk 7 spaces forward and then hop back three spaces. Ask, How many spaces from 0 are you now? (4) Write the number sentence to show what happened. (7 spaces – 3 spaces = 4 spaces.) Choose more students to model 14 hops – 6 steps, 12 steps – 9 steps, and 10 steps – 3 jumps.

Have one student walk to number 9 and another student walk to number 2. Guide the students to compare the actions of the students by asking, “What did the students that are standing on number 9 and number 2 do that was the same? What did they do that was different?” (They both walked as far as number 2, but one student kept walking to number 9.) Then ask, “How many more steps would the student on number 2 need to take to get to number 9?” Write the number sentence 2 steps + ___ steps = 9 steps. Develop the connections between addition and subtraction by showing that the student can count up the steps from 2 to 9 or subtract (walking backwards) 2 from 9 to find the unknown difference. Demonstrate how to rewrite the addition sentence as a subtraction problem to find the difference (9 steps – 2 steps = ___ steps). Call more students to model the following problems in the same way: 12 jumps – 6 jumps, 14 steps – 9 steps, 11 jumps – 5 jumps.

Provide students with a Number Line Stories BLM and have them write two story problems about traveling on a number line. When students are finished, allow volunteers to share their story problems, choosing other students to dramatize the story on the number line. Record the number sentence on the board that matches the story problem.

**Activity 8: Fact Families (GLEs: 7, 8, 12; CCSS: W.2.2).**

Materials List: a picture of your family, Fact Family House BLM, pencil, math learning logs

Display a picture of your family for the class and tell a little bit about the members of your family. Ask a child to tell how many people are in your photo. Then ask: “How many boys are there?” “How many girls are there?” Through a class discussion, develop an understanding that the members in a family are always related in some way. Explain that even though some of your family members are boys and some are girls, you all come together to make up the whole family.
Explain that in math, addition and subtraction facts that use the same three numbers are related. We sometimes call them “fact families.” Explain to the children that knowing related facts will help them as they memorize their basic facts. Tell them, “If you know one fact, then you know all of the facts in the fact family.”

To demonstrate this concept, draw a picture of a basic house on the board (triangle for a roof and rectangle for the house). At the top corner of the triangle, ask them to write the total number of family members that are represented in their family photo. On the bottom left corner, write the number of boys; on the bottom right corner, write the number of girls. (The example shows a family of 5, with 2 boys and 3 girls.) Model how to write the two addition facts and two subtraction facts that represent the members of their family. Tell a story when modeling each fact, such as: “If the 2 boys are home and then the 3 girls come home, all 5 family members will be at home.” List each of the related facts on the rectangular part of the house.

Distribute the Fact Family House BLM. Have students illustrate their family in the box at the top of the page. In order to provide practice with larger numbers, encourage students to draw cousins, aunts, uncles, etc. Guide the students to write the total number of family members, the number of boys and the number of girls on the roof of the house. Assist them as they complete the number sentences for the related facts. Allow the students to share their family pictures with a partner discussing how many boys, how many girls, and how many people total. Encourage them to describe their family pictures using mathematical language (such as addend, sum, difference, etc.).

On the board, display a fact family house with the number sentences completed. Ask a student to fill in the numbers on the “roof” that make up the fact family. Be sure to use a wide range of numbers that represent facts to 20. When presenting the doubles fact families, have students explain why the doubles only have one addition fact and one subtraction fact in the fact family. Repeat this several times. Then display a fact family house with 3 related facts, and one unrelated fact. Ask the students to determine which fact does not belong to the fact family and to identify the fact that is missing from the displayed fact family. Have the students record their thinking in their math learning logs (view literacy strategy descriptions) and explain why the selected fact does not belong. Allow students to share and compare their responses with a partner or small group.

**Activity 9: Subtraction Strategies (GLE: 7, 9; CCSS: 2.NBT.9, W.2.8)**

Materials List: 8 index cards per student, pencils, Math Fact Tools envelopes from Activity 3, markers or crayons, chart paper, fact practice sheets, flash cards (or index cards to create flash cards), math learning logs

Remind the students that math fact strategies are a way to help them add and subtract more quickly. Strategies are a bridge to memorization. As the students become more
efficient with these strategies, they should move towards memorization of the basic facts that each strategy represents.

Present the following subtraction strategies to students, allowing 1 to 2 days for students to practice and internalize each strategy. The students will create new modified vocabulary cards (view literacy strategy descriptions) for these subtraction strategies and add them to their “Math Fact Tools” envelope from Activity 3. See description of the vocabulary cards in Activity 1. As the subtraction strategies are introduced, ask students to identify addition strategies from their “Toolbox” that might relate to the subtraction strategy (i.e. Count Back is similar to Count On). Provide time for students to review and add facts to their subtraction strategy cards throughout the unit.

After teaching all of the subtraction strategies, the students should reflect on the following questions in their math learning logs (view literacy strategy descriptions).

- Which subtraction strategy has helped me the most?
- What are some facts I have learned by using this strategy?
- What is the most important thing to remember about this strategy?
- How has this strategy made it easier to subtract two numbers?

Allow students to share their responses in groups of four to determine how the subtraction strategies have helped each of them in different ways.

The following are some suggested subtraction strategies and their corresponding facts.

- **ZERO FACTS**: Take all, leave none! Take none, leave all!
  - Take All, Leave None: Numbers are the same, zero is the game!
    - 1-1 2-2 3-3 4-4 5-5 6-6 7-7 8-8 9-9
  - Take None, Leave All: Zero the Hero is at it again! When you subtract Zero from a number, the number is saved! The answer is the same as the number you started with.
    - 1-0 2-0 3-0 4-0 5-0 6-0 7-0 8-0 9-0

- **COUNT BACK**: See a -1, -2, or -3? Start with the big number and count back.
  - 9-3 8-3 7-3 6-3 5-3 4-3
  - 9-2 8-2 7-2 6-2 5-2 4-2 3-2
  - 9-1 8-1 7-1 6-1 5-1 4-1 3-1

- **DOUBLES TO SUBTRACT**: A double? No trouble! Think of the picture from the addition doubles to help.
  - Big Rig Crayon Box 2 weeks Egg Carton
    - 18-9 16-8 14-7 12-6
  - Fingers Spider Legs Soda Cans Car Wheels Eyes
    - 10-5 8-4 6-3 4-2 2-1
- TEN PARTNERS: Think of the 10-frame. What makes a 10?
  10-9  10-8  10-7  10-6  10-5  10-4  10-3  10-2  10-1

  o Remember the Ten Partners cheer for addition!

- NEIGHBORS: When numbers are neighbors, the difference is 1.
  2-1  3-2  4-3  5-4  6-5  7-6  8-7  9-8  10-9

- COUNT UP: When numbers are close, start small and count up.
  3-1  4-2  5-3  6-4  7-5  8-6  9-7  10-8  11-9
  4-1  5-2  6-3  7-4  8-5  9-6  10-7  11-8  12-9

- SNEAKY SUBTRACTION: When the top number is more than 10 and less than
  20, and the bottom number is “too big” to count back, use your 10 partners and
  add!

  Students must know their Ten Partners to be proficient with this strategy.
  Introduce the strategy using ten frames and then move to the abstract.

- NUMBER LINE SHIFT:

  11 – 7 is the same as 10 – 6.  11 – 7 = 4 and 10 – 6 = 4.

- THINK ADDITION: Use an addition fact that you know. (Can be used with all
  facts!)

  9-5  (5 + ___ = 9)  18 – 9 (9 + ___ = 18)

  What goes with 5 to make 9?  What goes with 9 to make 18?
Activity 10: Professor Know-It-All (GLE: 7; CCSS: 2.NBT.9, RL.2.1, SL.2.1a-c)

Materials List: Index cards, pencil, Math Fact Tools Envelopes (from Activities 3 and 9)

Allow students a few minutes to review their math tools vocabulary cards that are stored in the Math Fact Tools envelope created in Activities 3 and 9.

Divide the class into groups of four. Provide each group with 4 index cards. The groups will write one question about an addition or subtraction strategy on each of the index cards.

Sample questions might include:
- How much is 7 + 8 and what strategy can help you solve this fact?
- What do you get when you double 6? What picture helps you remember?
- How do you use the count back strategy to solve 8 – 2?
- Name 3 doubles facts.

Announce “It’s time for Professor Know-It-All!” Professor know-it-all (view literacy strategy descriptions), a strategy used to review learned content. Students are asked to be experts on the topic and are challenged by their classmates through thought-provoking questions. Not only are students expected to answer questions from their classmates, they are also responsible for creating questions related to the content at various levels of difficulty.

Select a group to be the “Professors.” The “professors” will stand in the front of the room, shoulder to shoulder. Have the members of the group call on the other groups to read one of their questions about the addition and subtraction strategies that they have learned. The “professors” will huddle to discuss how to answer the question. One student from the group will be selected to state the answer to the question. The class should consider the answer given and ask for elaboration or correction if needed. After each student in the group has had an opportunity to be the spokesperson, the class may congratulate them on their success at knowing all about their strategies. Choose a new group to come up as Professors Know-it-All and continue the questioning process.

To add novelty to the activity, provide props or costumes (detective hats, lab coats, crowns, etc.) and award certificates for the Professors!

Activity 11: Missing Addends (GLE: 8, 9, 12, 13)

Materials List: paper cup, cubes, Missing Addend Problems BLM, Common Addition and Subtraction Situations BLM (teacher reference), index cards

Before the lesson, label a paper cup with a question mark.
Ask a student to hold a cube train of ten linking cubes and to count the cubes out loud. Make sure that it is clear to the class that the cube train has 10 cubes. Ask another student to hold the paper cup. Take off three cubes and place them in the paper cup without the class seeing. Have the first student hold up the remaining 7 cubes on the cube train and count them aloud. Ask how many cubes they see. (7) Explain to them that there were 10 cubes in the beginning and now there are 7. They had 10 to start and now have 7. The number of cubes in the cup is unknown.

Have the students recall what they know about operations and fact families to determine how many cubes are in the cup. Write 10 – ? = 7 on the board. Guide the students to understand that if they know 7 + 3 = 10 or 10 – 3 = 7, then they know that the number of cubes in the cup must be 3. Students may also use a count up strategy by starting with the known number (7) and counting up to the total they started with (8, 9, 10).

Distribute the Missing Addends BLM with the following problems that include unknowns in all positions. (Refer to the Common Addition and Subtraction Situations BLM for an explanation of each problem type.) Have students work with partners to solve the problems by drawing a picture to represent the problem situations. After students have completed the problems, have them share their pictures and explain how they solved the problems.

**Add to – Start Unknown:** I had some pennies in my piggy bank. Mom gave me 7 more. Now I have 15 pennies. How many pennies did I have in my piggy bank? (¢ + 7 = 15, so ¢ = 8)

**Add to – Change Unknown:** There were 4 children on the slide. Some more children came. Now there are 8 children on the slide. How many children came? (4 +☺= 8, so ☺= 4)

**Take from – Start Unknown:** I had some peppermints. I gave 4 to my friends. Now I have 8. How many peppermints did I have before? (– 4 = 8, so □ = 12)

**Take from – Change Unknown:** Twelve flowers were growing in the garden. Christina picked some flowers to put in a vase. There were 3 flowers left in the garden. How many flowers did Christina pick? (12 – □ = 3, so □ = 9)

**Take from – Change Unknown:** There were 11 frogs on a log. Some frogs jumped in the pond. Then there were 4 frogs on the log. How many frogs jumped in the pond? (11 – ♣ = 4, so ♣ = 7)

**Put Together/Take Apart – Addend Unknown:** I have 13 shirts in my drawer. 7 are blue. The rest are white. How many white shirts do I have? (13 = 7 + ♥, so ♥ = 6)

Have students use text chains (view literacy strategy descriptions) to write addition and subtraction problems with unknowns. Text chains give students an opportunity to apply the content they have learned through writing. The students collaboratively write to
demonstrate their understanding. Put students into groups of 4. Give each student in the group an index card. Have the students write their name on the back of the card. Have each student begin a math problem by writing a beginning statement on his/her own paper. After each student in the group has written his/her beginning statement, have the students pass the papers to the right. Have the students read the beginning statement and add a new statement to the problem. Have the students pass the papers to the right again and have the third student write the next statement. Pass the papers again and have the fourth student write the question for the problem.

Example:
Student 1: I had 13 cookies.
Student 2: I gave some cookies to my friend.
Student 3: Now I have 7 cookies.
Student 4: How many cookies did I give to my friend? (13 - ? = 7. I know that 13 – 7 = 6, so 13 – 6 = 7. So I gave away 6 cookies.)

Pass the papers one last time so that each student has his/her original paper. The students will then read their completed text chain problems and find the answer to the unknown number. After students have solved their text chain problems, have them read the stories to the class and share how they found the unknown number.

Teacher Note: This is a great bell-ringer activity. Put counters in each of your hands. Open one hand and show students how many counters are in that hand. Then tell them the total number you are holding. Have students write the number sentence, and solve for the missing counters.

Activity 12: Comparison Problems (GLEs: 8, 9, 12, 13)

Materials List: bag of 5 cubes, bag of 18 cubes, chart paper, markers, Common Addition and Subtraction Situations BLM (teacher reference), Comparison Problems BLM (2 pages)

Show students a bag of 5 cubes and a bag of 18 cubes. Ask the students to tell ways that the bags of cubes are alike and ways they are different. (They both have cubes, the cubes are all the same color, one bag has more cubes, one bag has fewer cubes, the bag of five has less that the other bag, etc.) Explain that “comparing” is finding ways that things are alike and different. Write the word “compare” in large letters in the center of a piece of chart paper. Write the words “same,” “more,” “less,” and “fewer” around the word “compare” and discuss that these are some words that are used when comparing two amounts. Show the students a dictionary and a small picture book. Ask the class to compare the two books. As students use more comparison words, add them to the chart. (taller, shorter, larger, smaller, heavier, lighter, etc.) Ask the students to name any other words that they may know that show comparison. Add these words to the chart paper if they are appropriate. Explain to students that many problems in math involve comparing two objects or amounts. To solve these types of problems, a general method can be used. Write the following statement on the chart paper.
SMALL amount + the DIFFERENCE = LARGE amount

Discuss that when finding how two amounts are different, the smaller amount can be added to the difference to equal the larger amount. Discuss with the students that when the difference is unknown, the information can be rearranged to subtract the smaller number from the larger number, using the following general statement:

\[ \text{LARGER amount} - \text{SMALLER amount} = \text{DIFFERENCE} \]

Display the following problem:

There were 9 people at Karen’s birthday party. 12 people went to Jamie’s birthday party. How many more people went to Jamie’s party?

Explain to students that this problem is a comparison problem because it compares the number of people at Karen’s party with the number of people at Jamie’s party.

To solve this problem, explain that the information must be broken down to first determine what is known and what is unknown. Ask the following questions to guide the students in breaking down the information in the problem:

- Who had more people at their party? (Jamie)
- How many did Jamie have? (12)
- Who had fewer people at her party? (Karen)
- How many people did she have? (9)
- What is the difference in the number of people at the parties? (unknown)

Replace the words from the general method with the information from the problem.

\[ 9 \text{ people at Karen’s party} + \text{unknown difference} = 12 \text{ people at Jamie’s party} \]

\[ 9 + ? = 12 \]

Rearrange the information to subtract the smaller amount from the larger amount:

\[ 12 \text{ people at Jamie’s party} - 9 \text{ people at Karen’s party} = \text{unknown difference} \]

\[ 12 - 9 = ? \]

\[ 3 \text{ more people went to Jamie’s party than Karen’s party.} \]

Reinforce the connections between addition and subtraction by showing that the student can count up from 9 to 12 or subtract 9 from 12 to find the unknown difference. \([9 + ? = 12, \ 12 - 9 = 3]\).

In the following comparison examples, the difference is known, and the students must find the larger or smaller amount. Have the students follow the same process of breaking down the information and replacing the general method with the information from the problem.
• Allen has 6 balloons. Ashlyn has 4 more balloons than Allen. How many balloons does Ashlyn have?

Who has more? Ashlyn
How many does she have? unknown
Who has less? Allen
How many does he have? 6 balloons
What is the difference? 4 balloons

\[
\text{SMALL amount} + \text{ the DIFFERENCE} = \text{LARGE amount}
\]
Allen’s 6 balloons + 4 balloons = Ashlyn’s balloons
6 + 4 = ? Ashlyn has 10 balloons.

• The puppy is 2 pounds heavier than the kitten. The puppy weighs 7 pounds. How much does the kitten weigh?

Which weighs more? puppy
How much? 7 pounds
Which weighs less? kitten
How much? unknown
What is the difference? 2 pounds

\[
\text{SMALL amount} + \text{ the DIFFERENCE} = \text{LARGE amount}
\]
kitten’s weight + 2 pounds = puppy’s weight of 7 pounds
? + 2 = 7, rearrange to subtract ? = 7 – 2
The kitten weighs 5 pounds.

Distribute the Comparison Problems BLM. Have students work with a partner to break down the information, write an addition and a subtraction number sentence to represent the information, and then solve the problem to find the unknown amount. The students should write their final answer in a complete sentence using labels.

After students have solved the problems, select students to share their solutions with the class. Discuss how the questions help students in determining how to solve the problem.

Activity 13: Which Operation is Needed? (GLEs: 7, 8; CCSS: W.2.2, SL.2.1a-c)

Materials List: chart paper, marker, Common Addition and Subtraction Situations BLM (teacher reference), Add or Subtract BLM, math learning logs, index cards

Ask students to solve the following problem:

Ross has 1 cat. Ashley has 4 dogs. How many pets do they have altogether?
Ask students to tell if they added or subtracted the information and explain how they decided whether they should add or subtract. Create a T-chart with columns labeled "Times I Would Add" and "Times I Would Subtract" to display students' ideas as they brainstorm (view literacy strategy descriptions) examples of times when they might need to add (adding to or putting together) or subtract (taking from, taking apart, or comparing).

Have the students use split-page notetaking (view literacy strategy descriptions) to identify the operation for examples of common addition and subtraction situations. Split-page notetaking offers students an organized way to take notes and record information learned. As students get older, an efficient notetaking system will be critical in keeping track of the multiple concepts and information that students are expected to learn.

Provide students with an Add or Subtract BLM. This form will be used to guide students with the split-page notetaking format. As students become more familiar with the format of split-page notes, they will be able to draw the format on their own. The problems listed are examples of various common situations for addition and subtraction (refer to the Common Addition and Subtraction Situations BLM for explanations and examples of each of these situations). Discuss the addition and subtraction situations on the right side of the split-page notes and guide students to consider whether they should add or subtract the information. Have students discuss each situation with a partner and decide if it represents a time they would add or subtract. On the left side of the split-page notes, have the students write whether they would add or subtract and write an explanation of how they decided to add or subtract. After creating the split-page notes, model how to cover one side of the paper to review the concepts. Students can cover the left side, read the problem, and recall whether it is an addition or subtraction situation. By covering the right side, students can explain how the addition and subtraction situations work.

In their learning logs (view literacy strategy descriptions), have students write one story problem that represents addition and one that represents subtraction. Provide each student an index card. On the index card, have the students write “add” on one side and “subtract” on the other side. Divide the class into groups of four. Have the students share their story problems with their group. Have each group member determine whether he/she would add or subtract. Have students hold up their index cards to indicate the operation they chose. Have members of the group discuss what led them to choose adding or subtracting for each problem and identify which addition or subtraction situation is represented in the problem.

Activity 14: Favorite Type of Cookie (CCSS: 2.MD.10)

Materials List: chart paper, Cookies BLM, Graph Paper BLM, pencil, crayons, math learning logs

Before class begins, create a table and a picture graph outline on chart paper and label it with 4 types of cookies.
Cut out the Cookies BLM and distribute a cookie cut-out to each child. On the back of the cookie cut-out, have each student write which type of cookie is their favorite. Call each student to come to the chart and place a tally on the table below the type of cookie they chose.

After students have made their tallies, count the tallies for each type of cookie. Tell students they are going to construct a picture graph to display their data. Have the students tape their cookie cut-outs to the picture graph next to the name of their favorite cookie.

Present students with addition and subtraction situations (involving put-together, take-apart, and compare problems) to solve using the data on the graph. Use the following types of questions as a guide for presenting addition and subtraction problem situations. Have the students discuss how they solved the problems to find the answer:

- How many gingerbread cookies and oatmeal raisin cookies were chosen altogether?
- How many more students chose chocolate chip cookies than sugar cookies?
- If 6 more students choose sugar cookies, how many people will choose sugar cookies?

Using the Graph Paper BLM, have students transfer data to create a bar graph. Model how to set up the title, vertical scale, horizontal axis, and labels and then draw and color bars to represent the number of cookies shown on the pictograph. Also model how to create a horizontal bar graph by labeling the vertical axis and horizontal scale.

Ask students to write an explanation of how a picture graph and a bar graph are similar and different in their math learning logs (view literacy strategy descriptions). Allow students to share their ideas with the class.
Activity 15: Using Technology to Create a Class Graph (CCSS: 2.MD.10, RL.2.1)

Materials List: computer, graphing program Graph Club® or Excel®, paper, pencil, chart paper, My Survey BLM, index cards

Have students respond to a question with four answer choices such as “Which color do you like best?” Collect the data and show them how to create a bar graph using a program like Graph Club® or Excel®.

Illuminations Data Grapher (http://illuminations.nctm.org/ActivityDetail.aspx?ID=204) is an online graph generator that could also be used for this activity if the suggested programs are not available. Show students how the same data can be used to create a picture graph using the graphing program.

Ask students to think about what questions they could ask to take a survey. Create a list of possible survey questions on chart paper. Provide each pair of students a My Survey BLM. The My Survey BLM has two copies per page; however, students will only need one copy per pair. Have students work with their partner to create a survey question with four answer choices. Students may select a question from the list or create their own question. Have each pair of students ask 20 classmates to respond to their survey. Have students use the graphing program to input their data and create a bar graph. On index cards, have students write 3 addition/subtraction questions (one put-together, one take-apart, and one compare) that could be answered using the data displayed on the graph. Place the graphs and index cards together in a graphing center. Allow students to select a graph and set of cards and solve the problems using the data from the graph.

Activity 16: Daily Graph (CCSS: 2.MD.10, RL.2.1)

Materials List: students pictures pasted on a magnet, laminated sentence strip, laminated index cards with magnets, graph paper, paper, pencil, dry erase marker

Each day, write a question on a sentence strip to which students must respond. Use a magnetic board or a filing cabinet to set up the graph. Use index cards attached to magnets to label the vertical axis as “number of students.” Use additional cards to label the horizontal axis and the choices for the graph. Have students place their pictures above the index cards that indicate their response to the question. Have students transfer the data to a bar graph or create a pictograph. Also challenge them to write addition and subtraction questions that could be answered using the data.
Students need exposure to both vertical and horizontal graphs. Alternate the labels so that students can interpret data shown in various formats:

![Graph](image)

**Activity 17: A Graph of My Own (CCSS: 2.MD.10)**

Materials List: pencil, My Bar Graph BLM, My Picture Graph BLM

Place students in pairs for this activity. Provide each pair with the My Bar Graph BLM. Have each pair of students write a question and four answer choices to ask their classmates, such as favorite color, favorite food, favorite television show, etc. Have each pair of students survey up to 20 classmates and record tallies for the classmates’ selections at the top of the page. Have partners work together to create a bar graph of the data collected. Have students solve the problems on the BLM using the information presented in the bar graph. Repeat this activity on a subsequent day using the My Picture Graph BLM and have students create a pictograph of the data they have collected.

**Sample Assessments**

Performance and other types of assessments can be used to ascertain student achievement. Following are some examples:

**General Assessments**

- Use portfolio assessment to evaluate the unit. Included in the portfolio will be samples of stories and pictures, work samples, and teacher-made tests.
- Write a learning log entry such as: Have the student make up a story problem that goes with the number sentence $9 + 5 = 14$, and explain how to solve the problem.
• Given an illustration of addition or subtraction problem on a number line, have students write the related number sentence.

**Activity-Specific Assessments**

Fact assessments should be given weekly throughout this unit after teaching students a strategy.

• **Activity 7:** Give the student a number line from 1 through 20. Direct each student to start at a given number, and indicate that he/she is to model hopping so many spaces forward or backwards and state what number he/she landed on. Have the student write the number sentence to show which operation was used.

   Example:
   - Start on 7, and hop 3 spaces forward. Where are you? _______
   - \(7 + 3 = 10\)
   - Start on 12, and hop 5 spaces backwards. Where are you? _______
   - \(12 - 5 = 7\)

• **Activity 8:** Have students write 2 addition sentences and the 2 related subtraction sentences using the numbers in the example below.

   Example: The following colors of crayons were counted in the art center:
   
   5 red       7 blue    11 brown    3 white
   4 orange    2 yellow  9 black     6 pink
   1 purple    10 green 

   Example:
   - 4 orange crayons + 9 black crayons = 13 crayons
   - 9 black crayons + 4 orange crayons = 13 crayons
   - 13 orange and black crayons – 9 black crayons = 4 orange crayons
   - 13 orange and black crayons – 4 orange crayons = 9 black crayons

• **Activities 11, 12, & 13:** Given different real-life situations, have the student identify which operation is needed to solve the problem, write a number sentence with labels, and solve it.

• **Activity 17:** Give each student a copy of the My Bar Graph BLM. Have them create a question and four answer choices independently. Have students survey up to 20 classmates and create a bar graph representing the data collected. Students should answer the questions on the BLM using the information depicted in the bar graph.
**Grade 2 Mathematics**

**Unit 2: Understanding Place Value**

**Time Frame:** Approximately five weeks

**Unit Description**

This unit focuses on extending students’ understanding of place value as they count, model, read, write, and compare numbers up to 1000 using words, standard form and expanded notation.

**Student Understandings**

Students demonstrate their understanding of place value for numbers up to 1000. Students understand that a “hundred” is ten groups of ten. They count forward or backwards from a given number and count by fives, tens, and hundreds. Students read and write multi-digit numbers (up to 1000) written in standard form, expanded form, and word form. They recognize that the digits in each place represent amounts of hundreds, tens, or ones (e.g., 427 is 4 hundreds, 2 tens, and 7 ones). Students compare numbers using >, =, and < by starting with the hundreds, then tens, and then ones to determine numbers that are greater, less, equal, or not equal.

**Guiding Questions**

1. Can students count, show expanded and standard notation, and use cardinal number words to represent amounts up to 1000?
2. Can students compare and order a set of numbers using >, =, and <?
3. Can students count forward and backwards from a given number within 1000 and skip-count by fives, tens, and hundreds?

**Unit 2 Grade-Level Expectations (GLEs) and Common Core State Standards (CCSS)**

<table>
<thead>
<tr>
<th>GLE #</th>
<th>GLE Text and Benchmarks</th>
<th>CCSS for Mathematical Content</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade-Level Expectations</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Number and Number Relations</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Model, read, and write place values for numbers through 999</td>
<td>Count within 1000; skip-count by 5s, 10s, and 100s.</td>
</tr>
<tr>
<td></td>
<td>in word, standard, and expanded form (N-1-E)</td>
<td>Compare two three-digit numbers based on meanings of the hundreds,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>tens, and ones digits, using &gt;, =, and &lt; symbols to record the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>results of comparisons.</td>
</tr>
</tbody>
</table>
2.NBT.7 | Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

**ELA CCSS**

<table>
<thead>
<tr>
<th>CCSS #</th>
<th>CCSS Text</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reading Standards for Informational Text</strong></td>
<td></td>
</tr>
<tr>
<td>RI.2.1</td>
<td>Ask and answer such questions as <em>who, what, where, when, why, and how</em> to demonstrate understanding of key details in a text.</td>
</tr>
<tr>
<td>RI.2.6</td>
<td>Identify the main purpose of a text, including what the author wants to answer, explain, or describe.</td>
</tr>
<tr>
<td>RI.2.7</td>
<td>Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify text.</td>
</tr>
<tr>
<td><strong>Writing Standards</strong></td>
<td></td>
</tr>
<tr>
<td>W.2.2</td>
<td>Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.</td>
</tr>
<tr>
<td>W.2.8</td>
<td>Recall information from experiences or gather information from provided sources to answer a question.</td>
</tr>
<tr>
<td><strong>Speaking and Listening Standards</strong></td>
<td></td>
</tr>
<tr>
<td>SL.2.1</td>
<td>Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.</td>
</tr>
<tr>
<td>a.</td>
<td>Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).</td>
</tr>
<tr>
<td>b.</td>
<td>Build on others’ talk in conversations by linking their comments to the remarks of others.</td>
</tr>
<tr>
<td>c.</td>
<td>Ask for clarification and further explanation as needed about the topics and texts under discussion.</td>
</tr>
<tr>
<td><strong>Language Standards</strong></td>
<td></td>
</tr>
<tr>
<td>L.2.4c</td>
<td>Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on <em>grade 2 reading and content</em>, choosing flexibly from an array of strategies.</td>
</tr>
<tr>
<td>c.</td>
<td>Use a known root word as a clue to the meaning of an unknown word with the same root (e.g., <em>addition, additional</em>).</td>
</tr>
</tbody>
</table>
Sample Activities

Activity 1: Place Value Vocabulary (GLE: 1; CCSS: 2.NBT.4, L.2.4c)

Materials: Place Value Vocabulary Self-Awareness Chart BLM, math learning log, glue

At the beginning of this activity, provide the students a Place Value Vocabulary Self-Awareness Chart BLM. A vocabulary self-awareness (view literacy strategy descriptions) chart allows the student to assess his/her understanding of words and concepts that will be presented in the lesson. The teacher and student become more aware of which concepts the student comprehends and which concepts the student still needs to learn.

A vocabulary self-awareness chart is a list of important words from a lesson or unit that is provided to the students prior to the contents being taught. On the chart, the students indicate their comprehension of each word by recording a “+” to indicate a high level of understanding, a “√” to indicate they have heard the term do not fully understand it, or a “–” to indicate that the word is new to them. Have the student fill in an example and definition for words they indicate with a “+.” Have them predict examples or definitions for words with a “√”or “–.” Throughout the lesson or unit, have students revisit their vocabulary self-awareness charts to add new information and revise their examples and definitions. By the end of the unit, students should have a “+” next to each word, indicating a firm understanding of the concepts.

Have the students complete the Place Value Vocabulary Self-Awareness Chart BLM by filling in a “+”“√”or “–” in the second column. After students have completed their charts, have each student share which words he/she wants to learn more about. Have the students glue the chart into their math learning logs (view literacy strategy descriptions) to revisit in future activities.

Activity 2: Bundles of 10 and 100 (GLE: 1; CCSS: 2.NBT.2, W.2.2, W.2.8)

Materials List: 1000 popsicle sticks in a large zip-top bag, 100 rubber bands, chart paper, 10 quart-sized zip-top bags, permanent marker, math learning logs

Show the students the bag of popsicle sticks but do not tell them how many there are. Tell them that they are going to count the sticks today. Ask, “Since there are so many sticks, can anyone think of a plan to help you count and keep track of the sticks?” Allow the students to discuss their ideas in teams of 3 or 4 students. Write students’ suggestions on the board, accepting all reasonable responses. Guide the students to determine that the sticks can be grouped by tens.

Pair the students and give each pair approximately 100 popsicle sticks and 10 rubber bands. Have students work in pairs to count out 10 sticks and bundle them with the rubber bands. Ensure that students understand that only groups of ten can be bundled with the rubber-band and all “left-over” sticks should not be bundled. Divide a large piece of chart paper into 4 columns. At the top of the right-hand column, write the word ONES. At the top of the second column from the right, write the word TENS. Each pair of students will record the number of their bundles in
the tens column and the number of left-over sticks in the ones column. If a pair of students does not have any left-over sticks, they should record 0 in the ones column. Discuss the concept of tens and ones to ensure that students understand that the bundles are called tens and the single sticks are ones. Guide them to count their bundles by tens and count on any left-over sticks by ones to determine their total number of sticks. Discuss with the students that grouping by tens made it easier to count the sticks, but that there are still many groups to count.

Demonstrate how to create a group of ten bundles to make a hundred. Count out ten bundles by ten and place them in a quart-sized zip-top bag. Use a permanent marker to write the number 100 on the bag. Combine the pairs of students to work in teams of four to group their bundles of tens in quart-sized zip-top bags. Students should also see that they may be able to combine their left-over sticks to make another group of ten. Teams should be able to make at least one group of 100 and may have some tens or ones remaining. Return to the chart paper and write the word HUNDREDS at the top of the third column from the right. Record each team’s total number of hundreds, tens, and ones on the chart (be sure to record 0 if there are no tens or ones for a group).

Have the students sit in a large circle with the bags of 100, extra bundles of 10, and left-over single sticks in the middle. Discuss whether they can group any more sticks into bundles of 10 or make new groups of 100. Continue to group the sticks into tens and then hundreds until all of the sticks are grouped. Have students count the total number of bags to find how many groups of 100 were created (10). Record 10 on the chart in the hundreds column, 0 in the tens, and 0 in the ones. Discuss that when counting by hundreds, 10 hundreds are called “one thousand.” Guide the students to count by 100 up to 1000 to find the total number of sticks. Show students that the bags of 100 can be combined into the large zip-top bag to make a group of 1000. Label the final column on the chart THOUSANDS and write a 1 in the column, a 0 in the hundreds, a 0 in the tens, and a 0 in the ones.

Using the 4-column chart, discuss place value concepts for numbers up to 1000.

For example, if your chart includes the number 312, answer the following questions.

1. What is the digit in the tens place? (1)
2. What is the value of the digit 3? (300)
3. In which place is the digit 2? (ones)
4. How many hundreds are in the number? (3)
5. How many tens are in the tens place? (1)
6. How many tens are in the number? (31)

Students must be flexible with numbers. They have to know that 312 can be read as 3 hundreds, 1 ten, and 2 ones or as 31 tens and 2 ones or 312 ones. Repeat this activity using other numbers from the chart.

*Teacher Note: Although there is 1 ten in the tens place, there are 31 tens in the number. Students can count to 312 by tens to see that there are indeed 31 tens in the number.*

Using numbers from the 4-column chart, assign each student a different number that includes hundreds, tens, and ones. Have the students write an explanation of their number in their math learning logs (view literacy strategy descriptions). Have them explain how the bundles of 10 and
groups of 100 were formed and how they can be counted to find the number. Students should also describe how many hundreds, tens, and ones are in the given number. Allow students to share their descriptions with partners and discuss their ideas. The partners will identify the number from the chart that is being described.

Activity 3: Modeling Numerals (GLE: 1; CCSS: 2.NBT.2, W.2.2, W.2.8)

Materials List: Base-10 Blocks BLM or base-10 blocks (10 units, 10 rods, and 10 flats for each pair of students), laminated Place Value Mat BLM (on legal sized paper) for each pair of students, Digit Cards BLM, dry erase marker, dry erase erasers or socks, zip-top bags, paper in 3 colors (optional), Place Value Vocabulary Self-Awareness Chart BLM from Activity 1, math learning logs

Teacher Note: If base-10 blocks are not available, laminate and cut out copies of the Base-10 Blocks BLM. Consider copying the hundreds on one color of cardstock, the tens on another color, and the ones on a third color to make them easier for students to identify and reference. Store the sets in zip-top bags for use throughout the year. When using dry erase markers, use toddler-sized socks turned inside-out as erasers. Black socks work best because they don’t show the stains from the dry erase ink. The marker can be stored inside the sock for easy access.

Provide pairs of students with a set of base-10 blocks. Each pair should have 10 ones (units), 10 tens (rods), and 10 hundreds (flats). Hold up a unit and ask the students how many cubes you are holding. Show the students a rod and explain that the rod is made out of units connected together. Allow the students to explore how many units are equal to one rod. They should line up ten units next to the rod to see that ten units are the same as one rod. Next, hold up a flat. Allow the students to explore the number of rods that are equal to one flat. Guide the students to count the rods by tens to determine the number of units in a flat. Next, have the students stack the flats and count by hundreds. Guide them to the conclusion that ten flats will have 1000 units. Have students make connections to the popsicle stick bundles they created in Activity 2. Ask them why they think these blocks might be easier to use for counting than the popsicle sticks. (They are smaller; they are already connected together.)

Provide each pair of students with a laminated Place Value Mat BLM. Demonstrate how to show a 3-digit number using the flats, rods, and units on a place value mat. Show the number 347. Have the students write the numbers in the correct place on the Place Value Mat BLM with a dry erase marker. Working with partners, have the students place three flats, four rods, and seven units on their place value mats to show the number. Have the students count the flats by hundreds and then count on by tens and ones to count their base-10 blocks. Repeat the process using these numbers: 562, 403, 780, and 600. Discuss how to count when there is a zero in the tens or ones place.

Give each pair of students three sets of 0-9 digit cards. Have the students lay the cards face down on the table. Have one student select three cards and place each one in a section on the Place Value Mat BLM. Have the other student use base-10 blocks to represent the number. Have the students together count the blocks by hundreds, tens, and ones to verify the total. Have the
partners clear the mat, place the 3 digit cards in a discard pile, and switch roles to repeat the activity. Continue until all cards have been used.

Have students use their math learning logs (view literacy strategy descriptions) to illustrate the number 653. Have students draw a 3-column chart and label the columns “hundreds,” “tens,” and “ones.” Have them draw large squares to represent the flats, vertical lines to represent the rods, and dots to represent the units. Have students explain how the base-10 blocks or their drawings can be used to show a 3-digit number.

Create vocabulary cards (view literacy strategy descriptions) for the following words: digit, hundreds, tens, ones, and place-value. Add these cards to the vocabulary cards collection created in Unit 1. Consider writing the unit number or color a dot on the back to indicate the concept to which these cards relate. Be sure to allow time for students to review their cards individually and with partners in preparation for other class activities and quizzes.

Have students revisit their Place Value Vocabulary Self-Awareness (view literacy strategy descriptions) Chart BLM from Activity 1 and update it for the words digit, ones, tens, hundreds that were presented in this lesson.

**Activity 4: Number Words Connect Four (GLE: 1; CCSS: 2.NBT.2, L.2.4c)**

Materials List: scissors, chart paper, Digit Cards BLM, Number Words BLM, Number Words Cards BLM, zip-top bags, Number Connect Four BLM, Place Value Vocabulary Self-Awareness Chart from Activity 1

Give each student a Number Words BLM. Have him/her cut the chart apart and sort the words into groups. Students may sort words by ones, teens, tens, words with –teen, words with –ty, etc. Have students share ways they grouped the number words. Create a class chart on chart paper to display the number words and how they can be grouped:

<table>
<thead>
<tr>
<th>ONES</th>
<th>TEENS</th>
<th>TENS</th>
</tr>
</thead>
<tbody>
<tr>
<td>zero</td>
<td>eleven</td>
<td>ten</td>
</tr>
<tr>
<td>one</td>
<td>twelve</td>
<td>twenty</td>
</tr>
<tr>
<td>two</td>
<td>thirteen</td>
<td>thirty</td>
</tr>
<tr>
<td>three</td>
<td>fourteen</td>
<td>forty</td>
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<tr>
<td>four</td>
<td>fifteen</td>
<td>fifty</td>
</tr>
<tr>
<td>five</td>
<td>sixteen</td>
<td>sixty</td>
</tr>
<tr>
<td>six</td>
<td>seventeen</td>
<td>seventy</td>
</tr>
<tr>
<td>seven</td>
<td>eighteen</td>
<td>eighty</td>
</tr>
<tr>
<td>eight</td>
<td>nineteen</td>
<td>ninety</td>
</tr>
<tr>
<td>nine</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Many patterns begin to emerge in the number names for the teens and tens. However at this age, irregularities in number names can still cause confusion for many students.
Discuss that the ending *-teen* means “plus ten,” and the ending *-ty* stands for “groups of ten.”

- 14 – fourteen means 4 plus 10
- 60 – sixty means 6 groups of tens
- 42 – forty-two means 4 groups of tens plus 2

Have students recognize that though *eleven* and *twelve* are teen numbers, they do not contain the –*teen* suffix. Also have students identify words on the chart in the teens and tens columns that have spelling changes (thirteen, fifteen, twenty, thirty, forty, fifty). Discuss these irregularities to show how they relate to other “regular” number names.

- 11 – eleven means 1 plus 10
- 12 – twelve means 2 plus 10
- 20 – twenty means 2 groups of tens
- 34 – thirty-four means 3 groups of tens plus 4

Cut apart a Digit Cards BLM. Turn over two digit cards to create a two-digit number and have students find the number words to represent the two-digit number. Make a big deal about the hyphen. This will help students with expanded form. Twenty-three means 2 tens plus 3 more, or 20 + 3. Repeat the procedure. Circulate to assess students’ needs. Repeat as many times as needed.

Cut apart a Number Words Cards BLM for each pair of students and place the cards in a zip-top bag. Pair students with partners and give each pair a bag of number words. Give each student a Number Connect Four BLM. Have the students take turns pulling a number word from the bag and locating the numeral on the Number Connect Four BLM. Have the student cover the numeral with the number word. Play ends when one partner covers four numerals in a row either horizontally, vertically, or diagonally.

Have students revisit their Place Value *Vocabulary Self-Awareness* (view literacy strategy descriptions) Chart BLM from Activity 1 and update it for the suffixes –*teen* and *-ty* that were presented in this lesson.

**Activity 5: 3-digit Number Words (GLE: 1)**

Materials List: index cards, number word chart (created in from Activity 5), markers (red, blue, and green), dry erase boards, dry erase markers, sock erasers

Show the students the number word “hundred.” Explain that this word is used along with another number word to show the number of hundreds. For example, the word “four” and the word “hundred” could be put together to make four hundred, which means 400.

Display the number words chart that was created in Activity 5. Add a fourth column next to the TENS and label it HUNDREDS. Write the word “hundred” on the chart in this column. Discuss how the words are used to represent a three-digit number. Write 645 on the board. Ask a student to name the number. Have the student point to the words on the chart that are used to name the
number (six, hundred, forty, five). Display the following numerals for 249, 356, 420, 718, and 506 and have other students locate the number words for the numerals.

Create the following number word index cards using different color markers:

- Red: one, two, three, four, five, six, seven, eight, nine
- Blue: twenty-, thirty-, forty-, fifty-, sixty-, seventy-, eighty-, ninety-
- Green: one hundred, two hundred, three hundred, four hundred, five hundred, six hundred, seven hundred, eight hundred, nine hundred

Due to the nature of this activity, “ten” and “teen” numbers are not used.

Distribute a card to each student, making sure to have an equal number of each colored card. Have the students play Mix-Freeze-Group-Share to create and read three-digit numbers using words. Teach the students the following directions:

“When I say **mix**, you should walk slowly around the room. When I say **freeze**, you should stop walking and hold up your card so others can see the colors. When I say **group**, make a group of 3 with one student of each colored card in a group. When I say **share**, put your cards together in place value order to create a 3-digit number word. You will read the number word to the rest of the class.” Have three students demonstrate how to hold the cards in the correct order and read the words before beginning the activity.

If the number of students in the class does not divide equally by 3, make one or two groups that only have two students. They can create a two-digit or three-digit number that includes a zero (ex. twenty-seven, three hundred five, or six hundred forty).

Have the students trade cards within their group before mixing again so that they get practice reading different words each time.

If you have dry erase boards and markers for each student, the students may use these to record the numerals for the number words they have created.

**Activity 6: Spinning for Numbers (GLE: 1)**

Materials List: base-10 blocks, Place Value Cards BLM, Place Value Spinner BLM, Number Forms Recording Sheet BLM, paper clip, pencil, completed Place Value Vocabulary Self-Awareness Chart BLM from Activity 1

Discuss the use of base-10 blocks to represent a 3-digit number by asking the following questions: How can you use these blocks to show a number? What amount does a flat, a rod, and a unit each represent? (A flat represents 100, a rod represents 10, a unit represents 1.)

Show the number 435. Ask students to show this number using base-10 blocks. Give each student a bag of pre-cut Place Value Cards BLM and have them use the cards to represent the
value of the blocks. Have students find the cards for 400, 30, and 5. Model how to use the cards to show a 3-digit number in standard form by first laying down the 400, laying the 30 on top of it with the pointed ends aligned, and laying the 5 on top of the 30 with the pointed ends aligned. These cards can be used to show a three digit number in expanded form by spreading them apart and placing a + symbol between them. Have the students use base-10 blocks and the Place Value Cards to show a 3-digit number using concrete models, standard form, and expanded form.

Instructions for using the Place Value Spinner BLM:
1. Place the point of a pencil through a large paper clip.
2. Place the point of the pencil on the center of the spinner.
3. Adjust the paper clip so that the end of the paper clip is on the center of the spinner.
4. “Flick” the paper clip to spin it.

Put students into groups of 5 and provide each group with base-10 blocks, the Place Value Spinner BLM and 2 copies of the Number Forms Recording Sheet BLM. Assign the following roles:

Student 1: Spin each spinner to make a 3-digit number and record the number of hundreds, tens and ones on the Number Forms Recording Sheet BLM.
Student 2: Model the number using base-10 blocks and draw the model in the base-10 column.
Student 3: Write the number in standard form.
Student 4: Write the number in expanded form.
Student 5: Write the number in word form.

Continue the activity with students performing a different role each time.

<table>
<thead>
<tr>
<th>Place Value</th>
<th>Base-10 Model</th>
<th>Standard Form</th>
<th>Expanded Form</th>
<th>Word Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>hundreds</td>
<td>tens</td>
<td>ones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>3</td>
<td>213</td>
<td>two hundred thirteen</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>200 + 10 + 3</td>
<td></td>
</tr>
</tbody>
</table>

Call on each group to share how it recorded one of their numbers. Have students repeat the process five more times.

Have students revisit their Place Value Vocabulary Self-Awareness (view literacy strategy descriptions) Chart BLM from Activity 1 and update it for the concepts that were presented in this lesson.

**Activity 7: Pumpkin Seed Counting (GLE: 1; CCSS: 2.NBT.2, RI.2.1, RI.2.6, RI.2.7)**

Materials: *How Many Seeds in a Pumpkin?* by Margaret McNamara, 1-4 large pumpkins (if using more than one, choose different sizes) or bags of seeds, butcher paper to cover work area,
plastic gloves, baby wipes or paper towels, large pumpkin shapes cut out of bulletin board paper, white glue, marker, Pumpkin Seeds BLM, Digit Cards BLM, math learning logs

Teacher Note: The book, How Many Seeds in a Pumpkin?, is used as an introduction; however, the activity may be completed without using the book. In this book, the teacher brings in 3 different sized pumpkins and asks the students to guess how many seeds are in the pumpkins. The students then work in teams to group and count the seeds by twos, fives, and tens. If pumpkins are not available at the time of this activity, use bags of pumpkin or sunflower seeds instead. If using real pumpkins, cut the top of the pumpkin before beginning the activity. Check with the cafeteria manager for plastic gloves for each student and cover the student work areas with butcher paper. This activity can get messy!

Write the following words on the board: pumpkin, hundreds, count, group, tens, seeds, ones, guess, check. Have the students use these words to write a lesson impression (view literacy strategy descriptions) in their math learning logs (view literacy strategy descriptions). A lesson impression is used to introduce a lesson and focus students thinking on the content they will be learning. This strategy is especially helpful to struggling and reluctant learners as it helps them increase motivation and set a purpose for reading and learning. Students are provided with a list of words and are asked to use the words to write a prediction about what they will be learning during the lesson. Based on student writing abilities, they may write one or two sentences or use fewer words if needed. After students have written their predictions, allow volunteers to share their predictions. Students will be eager to see whose prediction is closest to what they will actually learn. After the lesson, have students refer to their lesson impression to review their predictions.

Example:

Pumpkins have a lot of seeds. We can group them by hundreds and tens and ones. We can guess how many seeds there are and count them to check.

Show the students the pumpkins. Discuss that pumpkins grow from seeds and are filled with seeds inside. Show the students the seeds inside one of the pumpkins. Ask the students how many seeds they think might be in the pumpkins. Write student guesses on the board. Ask the students how they could count all of the seeds. Help students make connections to counting the popsicle sticks in Activity 2.

Read the book How Many Seeds in a Pumpkin? Stop at various pages throughout the book to discuss what the characters are doing and how they are using math to count their pumpkin seeds. After reading the story, have the students determine that grouping the seeds by tens and then making groups of 100 will make it easier to count the seeds.

Divide the class into groups according to the number of pumpkins or bags of seeds available. If using real pumpkins, have students put on the plastic gloves and begin taking out handfuls of seeds. Have them separate the seeds and pulp, spreading the seeds on a flat, covered surface so that they can dry out. After all of the seeds have been collected, have the students work together to glue the seeds in groups of 10 to the large pumpkin shape. As they make a group of 10, have them circle the group with a marker and write 10 next to it. After all of the seeds have been
glued, have the students count each group by tens and make a larger circle around ten groups of 10 to show 100. Have students complete the Pumpkin Seeds BLM with their group to show the number of seeds in their pumpkin. After the glue has dried, display the pumpkin cut-outs. Collect and redistribute the Pumpkin Seeds BLMs to different groups. Have the groups match the BLM to the pumpkin cut-outs that show the correct number. Display the BLM next to the pumpkin cut-outs.

To close out the lesson, have students reread their lesson impressions in their learning logs. Have them draw a line under the lesson impression to split the page in half. On the bottom half, have the students write a summary of what they actually learned or did during the activity using the same words from the lesson impression.

Activity 8: Place Value Toss (GLE: 1)

Materials List: sheets of paper labeled ones, tens, hundreds; base-10 blocks, poster paper, 3 beanbags, Place Value Mat BLM, Number Forms Recording Sheet BLM

Have students brainstorm a list of 3-digit numbers used in school, at home, and in the neighborhood (house number, oven temperature, or page number in a book).

Divide the class into two teams. Put three sheets of paper labeled ones, tens, and hundreds about a foot apart on the floor in front of the room. Write a 3-digit number on the board. Have students on the first team select base-10 blocks that represent the number. If the number is 324, three students stand behind the “hundreds” label, each holding a flat, two stand behind the “tens” label, each holding a rod, and four stand behind the “ones” label, each holding a unit cube. The second team checks their answer and then takes a turn modeling a different 3-digit number. Continue playing several more rounds.

Play the following game:

- Put students into groups of 3.
- Divide a large piece of poster paper into 10 sections (squares) numbered 0–9.
- Label 3 different colored bean bags as ones, tens, and hundreds.
- Select a group to toss each beanbag onto a number on the board.
- Using the Number Forms Recording Sheet, have partners write the number in standard, word, and expanded form and make a model with base-10 blocks as quickly as possible.
- The first group to complete the form for the number gets to throw the beanbags for the next round.
Activity 9: Place Value Exchange (GLE: 1; CCSS: 2.NBT.2, 2.NBT.7)

Materials: base-10 blocks, Place Value Mat BLM, Place Value Spinner BLM, pencil, paper clip

Review which base-10 blocks represent hundreds, which represent tens, and which represent ones. Tell students that when a number is recorded, there should only be one digit recorded for each place in the number. Display the Place Value Mat BLM. Place a unit in the ones column and write the numeral 1 on the board. Place another unit and change the 1 to a 2. Continue adding units and changing the numeral until 10 is reached. Explain that 10 is a 2-digit number, and that ten units cannot be left in the ones place. Ask students to think about another way they could show 10 ones. Guide students to determine that one rod has ten units and can be written by placing a 1 in the tens place and a 0 in the units place. Continue counting units and exchanging ten units for rods up to 30.

Distribute Place Value Mats and base-10 blocks to the students. Write the number 75 on the board and ask the students to show the number with their base-10 blocks. Have them add units to the ones place until they have 10 units. Have them exchange the ten units for a rod. Ask them how many rods they have now. Record each number on the board and discuss what numeral they would write to show that there are no ones. When the students get to ten rods, ask them to count their rods by tens and think about what they will need to do. Have them exchange all of the rods for a flat and place it in the hundreds place. Write 100 on the place value chart on the board. Add another unit to model 101.

Divide the class into groups of 4. Distribute the Place Value Spinner BLM and a paper clip to each group. Have each student spin the ones, tens, and hundreds spinners and show the resulting number on his/her place value mat using the base-10 blocks. In round 2, have each student spin the ones spinner and add that number of units to the ones from his/her previous turn. If the student has 10 or more units, he/she will exchange ten units for a rod. Next, have the student spin the tens spinner and add rods to the place value mat, making an exchange for a flat if possible. Then he/she will spin the hundreds spinner and add flats to the mat. Have the student count the total and write it with a dry erase marker on the place value mat. Have each student continue to spin and add to his/her number until one student exceeds 1000. When a student exceeds 1000, that student will call out “Bust!” The team will clear their place value mats and play again until time is called. Continue this activity for an amount of time that is appropriate for your students to demonstrate that they understand when and how to exchange 10 ones for a ten and 10 tens for a hundred.

Activity 10: Order It! (GLE: 1; CCSS: 2.NBT.2, 2.NBT.4)

Materials List: 10 x 10 pocket chart, large hundreds-chart poster or cards numbered 1-100, clock or timer, index cards

Cut apart a hundreds chart poster (or use index cards labeled 1-100), and allow students to place the cut-up number cards in correct order in a pocket chart. After about 30 cards have been
placed, discuss patterns that are emerging (i.e., repetition of the numbers in the ones and tens places). Play the game, Make 100 Fast.

- Distribute all of the cards to the students. Tell the students that they will have 3 minutes to fill the 100s chart with their cards. When “Go” is said, the student holding the card with the number 1 places it in the pocket chart; then the student with number 2, and so on. The goal is for students to place all of the cards (1–100) in order as quickly as possible.
- Remind students to stay seated until the number ahead of theirs is placed in the chart. Allow them to walk fast but not to run.
- Repeat at various times during the unit as a review with the goal of shortening the time to fill the chart.
- Use only the even numbers from 2-100. Give each student an even number and have him/her skip count by 2s to 100 by placing their numbers in the chart, leaving an empty space for the odd numbers.
- As students become proficient with the numbers through 100, use index cards to create cards for the numbers from 100 – 999 in sets of 100 (e.g., 201-300).

Put students into groups of 4. Give each student an index card with a numeral on it. Each member of the group will contribute to a text chain (view literacy strategy descriptions) for each student’s number. Have each student write the first clue for his/her numeral on the back of the card and then pass the card to his/her left. The next student writes another clue for the numeral on the card. Students continue passing the card until the card returns to the “owner.” The “owner” checks the clues for validity and makes adjustments to false statements. Finally, each group exchanges cards and tries to guess the numeral on the card according to the clues that the students listed. Students should offer suggestions for improving the logic and accuracy of the clues in the text chains.

Example of a text chain:

47

My number has 4 tens.
My ones digit is less than 8.
My ones digit is greater than 6.
Which number am I?

Activity 11: The Missing Pieces (GLE: 1; CCSS: 2.NBT.2)

Materials List: Hundreds Chart BLM per group, 10 × 10 Grid BLM, 101-1000 Charts BLM (10 pages), zip-top bags

Create hundreds chart puzzles for each group of 3-4 students by copying the Hundreds Chart BLM onto colored cardstock. Use a different color of cardstock for each puzzle so that they will be easier to keep together and laminate them so that they can be used from year to year. Cut the
charts into 5-8 sections similar to the example below. For each puzzle, cut off 5 numbers and discard them from the bag so that there will be numbers missing when the hundreds chart puzzles are put back together. Place the remaining pieces in a zip-top bag.

Give each group a 10 × 10 grid and a bag of puzzle pieces. Have students place the puzzle pieces on the grid to find the five numerals that are missing from the chart. Let each group share its findings. After students have mastered cards from 1-100, use the 101-1000 Charts BLM to create puzzles for numbers 101-200, 201-300, etc. to provide students practice with higher numbers. Consider allowing students to use the bags for extra practice throughout the year when additional time is available.

The following website is an interactive hundreds chart. Students drag the missing numbers to the correct place on the hundreds chart. Use this activity for independent practice or on an interactive whiteboard as a whole class activity.
http://www.bbc.co.uk/schools/numbertime/games/mend.shtml

Activity 12:  Forward, Backward, or Skip (CCSS: 2.NBT.2, SL.2.1a-c)

Material List: Place Value Spinner BLM , Hundreds Chart BLM, 101-1000 Charts BLM (10 pages), large paper clip, pencil, one large popsicle stick per group of 4 students

Prior to this activity, copy the Hundreds Charts BLM and the 101-1000 Charts BLM on cardstock, punch holes in the top left corner of each, and place them on a binder ring in order. Create a set of charts for each group of 4 students. Consider laminating these charts for future use.
Use a large Hundreds Chart or a transparency copy of the Hundreds Chart BLM. Model how to locate a number by finding the tens in the rows and the ones in the columns. Choose a few numbers and locate them on the chart. Read the next 3 or 4 numbers to demonstrate counting forward, or the previous numbers to demonstrate counting backwards. Locate the number 15 on the chart. Model counting by fives. Draw a circle around the multiples of 5 to allow students to recognize the pattern on the hundreds chart. Locate 46 and count by twos. Locate 30 and count by tens.

Display one of the sets of charts Hundreds Chart and 101-1000 Charts BLMs for the students to see. Model how to use the charts to locate a 3-digit number. For the number 359, show the students how to find the page of 300s and then locate the 50s row and the 9s column. Demonstrate how to count by hundreds using the chart. Start on an even hundred (such as 200) and model how to skip to the next hundred (300) locating it on the next page. Continue locating the next hundred counting by 100 to 1000. As students become proficient with counting by 100, demonstrate how to skip count by 100 when starting on a random number (such as 157) and locating 257, 357, 457, and so on.

Divide the class into groups of 4. Assign each group a number (i.e. 1, 2, 3, 4) and label the popsicle sticks according to the number of the groups.

Select a student to use the Place Value Spinner BLM to choose a number. He/she should spin each spinner to get a hundreds-, tens-, and ones-digit, make a 3-digit number with the digits and write the number on the board. Have the groups work together to locate the 3-digit number on hundreds chart sets. Using teacher discretion depending on the number that was spun, ask the groups to count forward or backward by twos, by fives, by tens, or by hundreds to find the next five numbers in the sequence. Choose a numbered popsicle stick to select a group to stand and say the numbers aloud as the other groups check their findings.

Example:
The student spins 5 hundreds, 4 tens, and 5 ones.
Ask students to count forward by fives.
Groups will locate the number 545 on the set of charts.
Groups will determine that the next 5 numbers in the sequence are 550, 555, 560, 565, and 570.
If popsicle stick 3 were chosen, the students in group 3 will stand to recite the numbers in sequence together.

Activity 13: Place Value Word Grid (GLE: 1; CCSS: RI.2.1)

Material List: Place Value Word Grid BLM

Provide the students with a Place Value Word Grid BLM that utilizes a modified word grid (view literacy strategy descriptions). A word grid is used to help students learn important related terms and concepts in content areas. It provides a way to organize words and analyze the
similarities and differences of key features. *Word grids* increase student comprehension of vocabulary and concepts in context.

A *word grid* lists essential vocabulary on the vertical axis and key features or characteristics as headings across the horizontal axis. Students complete the grid by indicating how the words relate to the key features or characteristics. This *word grid* is modified in that instead of listing words on the vertical axis, the students will list numbers that they encounter and identify how the numbers relate to the key concepts of place value. The horizontal headings of this *word grid* are pre-filled. As students become more proficient with the use of *word grids*, they may fill in their own headings or add headings as needed.

To complete the *word grid*, have the students fill in the following numbers. Guide them through each column as they record the information for each numeral relating to the key place value concepts. As the unit continues, have students select a number that they encountered in each activity and record it on the *word grid*.

### Word Grid

<table>
<thead>
<tr>
<th>Numeral</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
<th>Number Before</th>
<th>Number After</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>47</td>
<td>0</td>
<td>4</td>
<td>7</td>
<td>46</td>
<td>48</td>
</tr>
<tr>
<td>170</td>
<td>1</td>
<td>7</td>
<td>0</td>
<td>169</td>
<td>171</td>
</tr>
</tbody>
</table>

After the *word grid* is completed, show students how to use the *word grid* to quiz each other about the key concepts. Have the students fold the first column back. Holding the paper so that the partner can see the first column, the student asks questions such as:

- Which number has 2 tens and 1 one?
- Which numbers are even?
- Which numbers are even?

Allow time for students to quiz each other on the information in preparation for class activities and quizzes.

### Activity 14: Hungry Alligator (CCSS: 2.NBT.4, SL.2.1a-c)

Materials List: base-10 blocks; Place Value Mat BLM; Place Value Spinner BLM; Greater, Less, Equal Alligator Tent BLM; glue stick, completed Place Value Vocabulary Self-Awareness Chart BLM from Activity 1, math learning logs
Provide pairs of students with base-10 blocks. Ask students to show a hundred block and a ten block. Discuss which block is larger and which block is smaller. Show students that 10 tens is the same as 1 hundred and that they can use the “=” sign to show that 10 tens = 100.

Continue to discuss comparisons using base-10 blocks for the following amounts:

675 and 567
Discuss that when comparing numbers, start by comparing the hundreds. Since 675 has 6 hundreds and 567 has 5 hundreds, 600 is greater than 500 so 675 is greater than 567.

23 and 230
The number 230 has 2 hundreds. 23 does not have any hundreds. When comparing a 2-digit number and a 3-digit number, the 3-digit number will be greater because it has hundreds.

507 and 570
Though the numbers have the same numerals, the numerals in each number do not represent the same place value. If the hundreds are the same, check the value of the tens. Since 0 tens is less than 7 tens, 507 is less than 570. The two numbers are not equal.

67 and 6 tens and 7 ones
67 contains 6 tens and 7 ones; therefore, the two representations are equal.

Have students set up a page in their math learning logs (view literacy strategy descriptions) for split-page notetaking (view literacy strategy descriptions). Model for the students how to draw a line down the page slightly to the left of the middle so that it is divided at approximately 1/3 of the page. In the left column, have students draw the following symbols: >, <, =, ≠. In the right column, have students write the meaning of each of the symbols and an expression to represent the symbol.

Example:

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>MEANING AND EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;</td>
<td>is greater than (or is more than)</td>
</tr>
<tr>
<td></td>
<td>675 is greater than 567</td>
</tr>
<tr>
<td></td>
<td>675 &gt; 567</td>
</tr>
<tr>
<td>&lt;</td>
<td>is less than</td>
</tr>
<tr>
<td></td>
<td>23 is less than 230</td>
</tr>
<tr>
<td></td>
<td>23 &lt; 230</td>
</tr>
<tr>
<td>=</td>
<td>is equal to (or is the same as)</td>
</tr>
<tr>
<td></td>
<td>67 is equal to 6 tens and 7 ones</td>
</tr>
<tr>
<td></td>
<td>67 = 6 tens and 7 ones</td>
</tr>
<tr>
<td>≠</td>
<td>is not equal to (or is not the same as)</td>
</tr>
<tr>
<td></td>
<td>507 is not the same as 570</td>
</tr>
<tr>
<td></td>
<td>507 ≠ 570</td>
</tr>
</tbody>
</table>
Students can refer to these *split-page notes* during the next part of the activity to help them verbalize the comparisons they are making. These notes can also be used as a study aid for future class activities and quizzes.

Place students in pairs. Distribute a Place Value Mat BLM and base-10 blocks for each student. For each pair of students, distribute a Place Value Spinner BLM and a Greater, Less, Equal Alligator Tent BLM. Pre-fold the Greater, Less, Equal Alligator Tent BLM on the lines and have the students glue the flap to make a 3-sided tent. Model for the students how to use the tent and find the correct symbol by turning it. Have the students place the tent between their place value mats. An alligator is used on the BLM to help students remember the direction of the greater and less than symbols. An alligator opens its mouth wide to eat the larger number. This can help students remember that the open part of the symbol faces the larger number. It does not teach students the concept of comparing numbers; it simply helps them remember the direction of the symbols.

Have each student spin the place value spinner to create a 3-digit number and use base-10 blocks to show the number on his/her place value mat. When both students have shown their numbers, have them compare the numbers to determine whose number is greater and whose is less, or if the numbers are equal. Have the students turn the Alligator Tent to the correct symbol to show which number is greater and describe the comparison using words from their *split-page notes*.

Have students revisit their Place Value *Vocabulary Self-Awareness* (view literacy strategy descriptions) Chart BLM from Activity 1 and update it for the concepts that were presented in this lesson.

**Activity 15: Compare Those Numbers!** (GLE: 1; CCSS: 2.NBT.4)

Material List: 3 × 5 cards, popsicle sticks, construction paper, glue

Review how to use the place value of the digits to compare 2-digit and 3-digit numbers. Using 2 popsicle sticks, form the symbols >, <, and =. Review the meaning of the three symbols with the students. Instruct each student to write a number from 10 through 99 on a 3 × 5 card. Ask two students to bring their cards to the front. Call a third student to stand between the two students and hold two popsicle sticks to form the symbol to compare the two numbers. Have the class read the comparison aloud. (For example: 56 < 87, the students say, “Fifty-six is less than eighty-seven.”)

After a few examples, have the students add another digit to their number to create a 3-digit number. Repeat the activity using the 3-digit numbers.

Give each student one popsicle stick and divide the class in half. Have them form an Inside-Outside Circle for a discussion (view literacy strategy descriptions). Have the students use their index cards to compare the numbers. Have the students compare the 3-digit numbers to tell which number is greater or less, or if the two numbers are equal. Have the students use the popsicle sticks to form the correct symbol with their partners and then say the comparison aloud.
After students compare numbers, have the inside circle walk in a clock-wise direction until “STOP” is called. When “STOP” is called, have the students stop in front of new partners and compare the numbers. On the next rotation, the outside circle can rotate. Continue rotating the circles to allow students practice comparing various numbers. On the final rotation, have the two students glue their cards to a piece of construction paper with the popsicle sticks between them to form the correct comparison.

Activity 16: Place Value Trash Can (CCSS: 2.NBT.4, W.2.2, W.2.8)

Materials List: Place Value Trash Can BLM, one number cube per pair of students, math learning logs

The object of this game is to create either the largest number or smallest number possible using the digits rolled. Have students take turns rolling a number cube. For each digit rolled, the student must decide whether to write the number in the hundreds place, tens place, ones place, or in the trash can. Once students have written the number in a place, it cannot be changed. They can only place one number in the trash can for each round. The trash can may or may not be used by a student during a round. Continue taking turns to roll the dice until both players have filled in each place value. In order to win a round, the player with the highest (or lowest) number must be able to correctly identify whether his/her number is greater than or less than his/her partner’s number by drawing the symbol in the box on the BLM and reading the comparison orally. The best out of 5 is the Trash Can Champ.

Observe partners playing and discuss strategies they have discovered for making the largest and smallest numbers. Have students explain their strategies in their math learning logs (view literacy strategy descriptions).

Activity 17: I Have….Who Has? (GLE: 1)

Materials List: I Have…Who Has? Cards BLM (2 pages)

Prior to class, run off cards on cardstock, laminate them and cut them out. Play a round of I have…Who has? Provide one clue card for each student. Make sure to hand out all of the cards (some students may get more than one card). It does not matter who starts reading the first clue since the cards will circulate back to the first person from the last clue. Choose a student to stand and read his/her card aloud. The student with the “I have” statement that answers the “Who has” question will stand and read his/her card. Play continues until the cards circle back to the student that had the first clue.

First clue reads: I have 140. Who has 3 hundreds and 2 tens?
I have 320. Who has 8 tens and 4 ones?
I have 84. Who has 1 hundred and 8 ones?
I have 108. Who has 6 tens and 7 ones?
I have 67. Who has 4 hundreds and 2 ones?
And so on. The final clue will lead back to the first clue.
Sample Assessments

Performance and other types of assessments can be used to ascertain student achievement. Observation and performance based assessments will be used whenever possible. Following are some examples:

General Assessments

- Maintain portfolios which contain copies of individual and group projects completed successfully during this unit: a student-made game using the hundreds chart, tables, charts, graphs, or pictures made by the student, and teacher-made tests on specific topics studied.

Activity-Specific Assessments

- **Activity 4**: Cut apart the Number Word Cards BLM and place the cards in a bag. Have students select 5 cards from the bag. Have students record the number in standard form.

- **Activities 6, 7, 8**: Give several numbers and have students write the numeral, number word, and expanded form of the number.

- **Activities 6 and 8**: Fill in one representation of a number in each box on the Number Forms Recording Sheet BLM and distribute a copy to each student. Have the students fill in the remaining representations for each of the numbers on the charts.

- **Activity 11**: Have students fill in ten missing numbers in a hundreds chart.

- **Activities 14, 15, 16**: Have students draw models of 300, 670, 412, 509, 629, and 150, write them in word form and expanded form. Have them also complete statements such as these:
  629 is greater than __________.
  509 is less than __________.
  __________ is the greatest number listed.
  What number would be on the left of 412 on a number line? __________
  What number would be on right of 629 on a number line? __________

- **Activities 14, 15, 16**: Given pairs of numbers, have students identify whether the numbers are equal or not equal. If the numbers are not equal, have students state which number is greater using the appropriate words and symbols.
Time Frame: Approximately four weeks

Unit Description

This unit extends students’ knowledge of addition and place value to the addition of 2-digit and 3-digit numbers.

Student Understandings

Students understand place value and properties of operations and use this knowledge to develop methods for computation within the base-10 system. Students mentally add numbers with only tens or hundreds. Students use their understanding of addition to fluently add 2-digit numbers within 100.

Guiding Questions

1. Can students mentally add numbers with only tens or only hundreds?
2. Can students solve 2-digit addition problems with and without regrouping?
3. Can students solve 2-digit addition word problems within 100 involving one-step or two-step operations and up to four addends?

Unit 3 Grade-Level Expectations (GLEs) and Common Core State Standards (CCSS)

<table>
<thead>
<tr>
<th>GLE #</th>
<th>GLE Text and Benchmarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number and Number Relations</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Model, read, and write place values for numbers through 999 in word, standard, and expanded form (N-1-E)</td>
</tr>
<tr>
<td>8.</td>
<td>Recognize, select, connect, and use operations, operational words and symbols (+, −) for addition (join, part/part/whole) or subtraction (take away, comparison, missing addend, and set/subset) situations (N-6-E) (N-5-E)</td>
</tr>
<tr>
<td>9.</td>
<td>Add and subtract 1- and 2-digit numbers (N-6-E) (N-7-E)</td>
</tr>
</tbody>
</table>
## CCSS for Mathematical Content

<table>
<thead>
<tr>
<th>CCSS #</th>
<th>CCSS Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.NBT.7</td>
<td>Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.</td>
</tr>
<tr>
<td>2.NBT.8</td>
<td>Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.</td>
</tr>
<tr>
<td>2.NBT.9</td>
<td>Explain why addition and subtraction strategies work, using place value and the properties of operations.</td>
</tr>
</tbody>
</table>

### Measurement and Data

<table>
<thead>
<tr>
<th>CCSS #</th>
<th>CCSS Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.MD.6</td>
<td>Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, … , and represent whole-number sums and differences within 100 on a number line diagram.</td>
</tr>
</tbody>
</table>

## ELA CCSS

<table>
<thead>
<tr>
<th>CCSS #</th>
<th>CCSS Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>W.2.2</td>
<td>Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.</td>
</tr>
<tr>
<td>W.2.8</td>
<td>Recall information from experiences or gather information from provided sources to answer a question.</td>
</tr>
</tbody>
</table>

### Speaking and Listening Standards

<table>
<thead>
<tr>
<th>CCSS #</th>
<th>CCSS Text</th>
</tr>
</thead>
</table>
| SL.2.1  | Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.  
  a. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).  
  b. Build on others’ talk in conversations by linking their comments to the remarks of others.  
  c. Ask for clarification and further explanation as needed about the topics and texts under discussion. |
Sample Activities

Activity 1: Adding 10 and 100 (GLE: 1; CCSS: 2.NBT.8)

Materials List: 3 sets of Large Digit Cards, binder rings, base-10 blocks, colored tiles, Adding 10 and 100 Game Board BLM, Game Cube BLM

Prior to this activity, prepare a Game Cube BLM for each group of 3 or 4 students.

Copy three sets of the Large Digit Cards BLM on cardstock and place them in ascending order on binder rings. Display the number 58 using two sets of large digit cards. Using base-10 blocks, show the students 5 rods and 8 units. Add one rod to the set and ask students to tell how many rods there are now. Flip the large digit card from 5 to display a 6. Discuss how the number changed when a ten was added. (The tens digit increases by 1 but the ones digit stays the same.) Choose a student to display a number using the cards and another student to model the number using base-10 blocks. Have the students predict what the new number will be if 10 is added. Add a rod to the set and count to verify their predictions. Repeat this process using all three sets of large digit cards and the flats, rods, and units to represent 3-digit numbers up to 900, such as 245, 394, and 809. Ask the students to predict how a 3-digit number will change if a ten is added. (The ones digit will remain the same and the tens place will increase by 1. The hundreds digit will change only if there is a 9 in the tens place.) Finally ask students to predict how the number will change if 100 is added. (The hundreds place will increase by 1, the tens and ones digits will remain the same.) Continue this process until students demonstrate an understanding of adding 10 and 100 to a 2-digit or 3-digit number.

Divide the class into groups of 3 or 4 students. Provide each student with a different colored tile to use as a game marker. Provide an Adding 10 and 100 Game Board BLM, a dry erase board and marker, and a game cube for each group. Have each student place his/her game marker on the starting place. One student will roll the game cube and move the indicated number of spaces. That student will use the dry erase board to write the number on which he/she landed. Then he/she will change the number on the dry erase board to add 10 or 100 as indicated on the game cube. If the answer is correct, the student will leave his/her marker on that space. If incorrect, the student will move the marker back to the space he/she was on previously. Each student will take turns, continuing until all students cross the finish line.

Activity 2: Counting on Tens and Hundreds (GLEs: 1, 9; CCSS: 2.NBT.7, W.2.2)

Materials List: per pairs of students – Tens and Hundreds Spinner BLM, Adding 10 and 100 Recording Sheet BLM, large paper clip, 2 number cubes, ten base-10 blocks (flats and rods) math learning logs, pencil

To review place value, ask the students, “What single digit is used to represent a number when there is one more than 9?” They should say, “There is no single digit that represents ten.” Ask, “What digits are used to represent ten?” Then remind students that the digits have a meaning according to where they are placed. Tell students that the number system requires that when
there are more than 9, a group of 10 is made. The number 10 means 1 group of ten and zero ones. When there are 10 tens, a group of 100 can be created. The number 100 means 1 group of a hundred, zero tens, and zero ones.

Write “5 + 3 = ___” on the board and have the students reply with the answer. Ask two students to come to the front of the room. Give the first student 5 base-10 rods and the second student 3 base-10 rods. Write “5 tens + 3 tens = ___ tens.” Ask students to use their knowledge of addition facts to tell the total number of tens rods the two students are holding. Tell students that if they know 5 + 3 = 8, then they can apply their knowledge of addition fact strategies and place value to add tens. Ask the students to tell what the numbers 5 tens and 3 tens represent (50 and 30). Write “50 + 30 = ___” on the board. Have students count by tens using the count on addition strategy. Start at 50, then count “60, 70, 80” to find the sum of 50 + 30. Write “50 + 30 = 80.” Repeat this process using 5 hundreds and 3 hundreds and counting on by hundreds. Rewrite the problems vertically demonstrating how to align the hundreds, tens, and ones. Explain the importance of adding hundreds to hundreds, tens to tens, and ones to ones.

Play Adding 10 and 100
Put students into pairs. Give each group a Tens and Hundreds Spinner BLM, two number cubes, and ten base-10 flats and rods. Have Partner A spin the spinner to determine whether they are adding tens or hundreds. Have each partner roll both number cubes to determine how many base-10 blocks he/she will use. Using the Adding 10 and 100 Recording Sheet BLM, have Partner A record his/her number at the top of a hundreds, tens, and ones chart and Partner B record his/her number in the same chart below Partner A’s number. Have Partner B add the total of the two numbers while Partner A counts the base-10 blocks to check the sum. Have partners switch rolls in the next round. Partner B will now spin the spinner and Partner A will now write the sum. Continue for a determined amount of time or until the students have completed the recording sheet.

Example:
Partner A spins and lands on tens. Partner A rolls 4 on the number cube. He/she counts out four rods and places them in a pile. He/she says, “4 tens is forty,” and records the amount on the Adding 10 and 100 Recording Sheet BLM. Be sure that students are filling in the zero for ones or tens when necessary. Partner B rolls a 5 and counts out 5 rods adding them to the pile. Then he/she says, “5 tens is fifty,” and records it on the Recording Sheet. Partner B writes the total of 40 + 50 and Partner A counts the rods by ten to check, or starts at 40 and then says 50, 60, 70, 80 as each ten is added to the pile.

Though the focus of this activity should not be on composing a new hundred, students may need to apply this knowledge if they roll numbers that equal 10 or more. Remind students that they will need to compose a new hundred. Instead of composing the hundreds, students may write both digits in the hundreds column, but point out that the number may be read using the words hundreds or a thousand (e.g. thirteen hundreds or one thousand, three hundred.)
In their math learning logs (view literacy strategy descriptions), have students compare and contrast adding tens and hundreds to adding ones. Have them state how knowing their basic facts can help them add tens and hundreds without having to count out large numbers of cubes. After students have had sufficient time to respond, have them share their explanations with their partners.

**Activity 3: Rods to Flats (Tens to Hundreds) (GLEs: 1, 9; CCSS: 2.NBT.7)**

Materials List: number cubes, rods, flats

Set up a “bank” of rods and flats. Divide the class into teams of 5 to 8 students. Have each team form a line.

Have the first member of each team roll a number cube to indicate how many rods he/she will collect from the “bank.” Have the first person hand the rods to the second person who must roll and collect more rods. The second person passes the rods to the third person who either rolls or regroups the rods for a hundreds flat. Inform students that they may not roll if they need to regroup but must go to the bank, trade 10 rods for a flat, and then pass the blocks to the next person.

Example:

The first player rolls a 6 and collects 6 rods, then passes the rods to the second person in line. The second person must roll because he/she can’t regroup. He/she rolls a 5 and collects 5 rods from the “bank” and passes all 11 rods to the third person in line. The third person in line must go to the bank and trade 10 rods for a flat, then pass the flat and the rods to the fourth person in line who must roll. Play continues until the last person in line has a chance to roll or trade. If the last person collects more than 10 base-10 blocks, he/she must regroup before returning to their line. Each line must announce how much the team collected.

Play several rounds. After the final round, lead a class discussion to allow students to share how they knew when it was necessary to exchange the rods for flats to compose a new hundred.

**Activity 4: Ten Tens (GLEs: 1, 9; CCSS: 2.NBT.7)**

Materials List: number cubes, ten- and hundred-dollar bills (classroom money), Ten Tens BLM per student, pencil

Ask students: How much is 10 tens? Have them model what happens when they have one more than 9 tens. Count out 10 ten-dollar bills. Have students count with you saying 10, 20, 30,…100. Ask students what happens if they have 13 tens. Count out 13 ten-dollar bills and then count the money saying 10, 20, 30, …100, 110, 120, 130. Point out to students that 10 tens is 100 and 13 tens is 130. Ask students what the value of 17 ten-dollar bills would be.
Play Trading for 100
Put students into groups of four. Give each group a number cube, 12 ten-dollar bills and 10 hundred-dollar bills, and a Ten Tens BLM for each member of the group. Have each student take turns rolling the number cube. Have the first student roll and count out ten-dollar bills to show the number rolled in tens. Have the student record the number rolled and how much money is displayed. Have the second student roll the number cube and add his/her ten-dollar bills to the amount that the first student had. If the sum of the two amounts is more than 10 ten-dollar bills, have the student trade the tens for a hundred-dollar bill and keep the remaining tens (ex: the first student rolls 5 and the second student rolls 6; the second student will add 6 ten-dollar bills to the 5 ten-dollar bills and then trade ten of the bills for a 1 hundred-dollar bill, keeping the extra ten-dollar bill to show $110). Have them record this information on the Ten Tens BLM. Have students 3 and 4 continue the activity, rolling and adding bills, making a trade for $100 as needed, and recording the information on the Ten Tens BLM. Play at least four rounds, alternating the student that begins each round to allow each student an opportunity to experience trading ten ten-dollar bills for a hundred-dollar bill. Play additional games if time permits or leave materials in a center for a rainy day or early finisher activity.

Example:

Roll #1 6 tens = $60
Roll #2 3 tens = $30
$90 total so far

Roll #3 4 tens = $40
$130 total so far

Roll #4 5 tens = $50
$180 total so far

Activity 5: Number Line Addition (GLE: 9; CCSS: 2.MD.6, W.2.8)

Materials: cash register tape, 2 colors of markers, Student Number Line BLM (2 pages), Number Cards BLM, color tiles, cardstock, zip-top bags, math learning logs

Students were introduced to adding and subtracting to 20 on a number line in Unit 1. This activity will extend the concept to adding and subtracting two-digit numbers within 100 on a number line. Prior to this activity, use a strip of cash register tape to create a large number line from zero to 100. Write the tens (10, 20, 30, etc.) in a different color to highlight them. Leave sections of the number line blank to allow students to assist in completing the numbers on the number line. Be sure to space the numbers equally on the number line. The number line can also be created on an interactive white board. Number lines to 100 can be purchased at most dollar...
Display the number line for the students. Ask students to share what they notice about the number line. (It starts at 0; it ends at 100; some sections are missing; the numbers increase by 1 from left to right; the numbers are spaced evenly.) Ask students to help complete the number line by filling in the numbers that are missing. Ask students to recall how to use a number line for adding and subtracting. Have a student explain how to add 7 + 4 on the number line. Have another student explain how to subtract 9 – 3 on a number line. Explain that a number line can be used to show how to add larger numbers as well.

Divide the class into pairs. Give each pair of students a Student Number Line BLM that has been copied on cardstock. Have the students cut out the number line strips, glue them together and fill in the numbers for 0 to 100. Display the addition problem 30 + 20. Give each pair of students a color tile. Have them place the tile on number 30 on the number line and skip count by tens to add 2 tens. Repeat this process using the addition problem: 40 + 30.

Display the problem 24 + 30. As students add 24 + 30, have them count the 10 spaces and notice that for every ten spaces, the tens digit changes and the ones digit is still 4. Understanding how to skip count from any given number will help them as they add larger numbers. For 24 + 30, work with the students to add by skip counting the tens: start at 24, skip to 34, skip to 44, skip to 54. Repeat this with 35 + 60.

Display the problem 24 + 32. Have students locate 24 on the number line and work with their partners to show how to add 32. Observe students as they add using the number line. Assist students who may still have trouble with skip counting on the number line. After making two jumps of ten to reach 54, students will jump by ones to 55, and 56 to add the 2 ones. Discuss that since numbers can be added in any order, it is often easier to start with the larger number when using a number line to add. Have the students repeat the process starting at 32 and adding 24.

Problems that involve regrouping may also be shown on a number line. Display the problem 45 + 27. Have the students locate 45 on the number line and add 27. Have students make two jumps of ten and then seven single jumps.
Students may also choose to start by adding the tens (start on 40 and add two tens) and then the ones (add 12 ones or another 10 and 2 ones).

There are other ways students might use the number line to add 45 + 27. Allow students to choose the numbers that make the addition easier for them. Provide each pair of students with a bag of number cards. Have one student from each pair choose a card from the bag and place his/her color tile on that number on the number line. The second partner will select another card from the bag and move the color tile to find the sum for the two numbers. Continue this activity for 5 to 10 minutes to allow students time to practice adding on the number line. Partners should alternate who chooses the first number and who finds the sum.

Present the following problem for the students to record in their math learning logs (view literacy strategy descriptions).

There were 26 students on the bus. 18 more students got on. How many students are on the bus now?

Have students draw a number line in their math learning logs and solve the problem. The students should write to explain how they used the number line to find the solution.

After students have completed their learning log entries, select two students to lead a fishbowl discussion (view literacy strategy descriptions). In the fishbowl discussion, a small group of students is selected to discuss a problem while a larger group of students looks on. The larger group listens carefully but does not contribute to the discussion. The two selected students will share how they solved the problem and how they used the number line. If the two students disagree on a point, they should explain their thinking. At a point of disagreement, or after the two students have completed their discussion, allow the outside group to discuss with a partner whether they followed the same procedures or whether they agree or disagree with the ideas of the two selected students. Allow students to share with the class their ideas after they have discussed them with partners.

Save the student number lines and register tape number line for use in Unit 4

**Activity 6: Adding Tens and Ones (GLEs: 1, 9; CCSS: 2.NBT.7)**

Materials List: classroom bills (ones, tens, hundreds) per group of students, base-10 blocks, pencil, Place Value Mat BLM, 2-Digit Addition Process Guide BLM, paper, math learning logs
Model this problem using one-dollar and ten-dollar bills.

Patrick had $15 in his wallet. His sister, Natalie, gave him $6 for washing her car. How much money does he have now?

Display a ten-dollar bill and 5 one-dollar bills. Ask students what operation is needed to solve this problem. Add 6 one-dollar bills to the display. Ask students how much Patrick has now. Model putting like amounts together (5 ones + 6 ones is 11 ones). Ask students what happens when there are more than 9 ones? (There is a need to compose a group of 10.) Trade 10 one-dollar bills for a ten-dollar bill. Add the new ten-dollar bill to the existing ten-dollar bill. Tell students that Patrick now has 2 ten-dollar bills and 1 one-dollar bill. Patrick has $21 after washing Natalie’s car.

Using a process guide (view literacy strategy descriptions), lead students through the steps involved in adding 2-digit numbers. A process guide is used to stimulate and support students’ thinking as they learn and process new information. As students work through the process guide, they are more focused on the information presented. Process guides may be used for basic recall of information to application of new knowledge and problem-solving. After completing a process guide, students should be given an opportunity to discuss and explain their thinking as they worked through the guide.

Provide students with a copy of the 2-Digit Addition Process Guide BLM, base-10 blocks, and the Place Value Mat BLM. Explain to the students how to work through the process guide using the text (addition problem) presented at the top of the page. Have the students read each step of the guide carefully and follow the directions, thinking about and modeling what to do with the blocks as prompted. If needed, read the process guide aloud based on students’ independent reading abilities and lead a discussion after each step of the process has been completed. Students who are capable of reading the guide independently may attempt the steps on their own and then form a small discussion group to share their thinking with others.

In their math learning logs (view literacy strategy descriptions), have students write the problem from the process guide and record their solution with a drawing of the base-10 blocks (draw a line for rods and a dot or small circle for units). Have students write an explanation of the process of 2-digit addition in their own words. Allow students to share their explanations with the class.

For example, to add 39 + 25, a student might draw and write the following:

<table>
<thead>
<tr>
<th>TENS</th>
<th>ONES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

First I add my tens and then I add my ones. 3 tens + 2 tens is 5 tens, and 9 ones + 5 ones is 14 ones.

If there are more than 9 ones, I need to compose a new ten. I could take 10 ones and compose 1 ten. That would give me a total of 6 tens and 4 ones.
So $39 + 25 = 64$.

Write new 2-digit addition problems with and without regrouping on the board. Have the students use their process guides to lead them through these 2-digit addition problems, thinking about the questions and connecting the original process to the new problems. Students may record their work through drawings and write out their explanations for their solutions in their own words.

**Activity 7: Place Value Addition (GLEs: 1, 9; CCSS: 2.NBT.7, 2.NBT.9, W.2.2)**

Materials List: zip-top bags, Place Value Cards BLM, Expanded Form Mat BLM, math learning logs

Prior to the lesson, copy and cut apart a set of the Place Value Cards BLM (tens and ones only) for each student. Store each set in a zip-top bag. These cards can be used to represent the expanded form of a number as well as the standard form. To show the standard form, the arrow ends of the cards should be aligned evenly with the ones overlapping the tens.

Display the following problem: $32 + 25 = \_\_\_$.

Give each student a bag of place value cards and an Expanded Form Mat BLM. Have the student show the number 32 by using the place value cards on the Expanded Form Mat. Have students lay the 30 card and the 2 card in the corresponding places on the top row of the mat. Show students how to slide the cards together laying the 2 on top of the 0 in 30 and aligning the pointed ends to create the standard form. To show the expanded form, the cards separate the cards. Have the students display 25 using the 20 card and the 5 card and review how to show the standard and expanded form with this number. Guide students in adding the two numbers using the place value cards:

For the problem, $32 + 25$,
1. Separate the cards to show the expanded form.
2. Add the ones together: $2 + 5 = 7$ (Show 7 with a place value card.)
3. Add the tens together: $30 + 20 = 50$ (Show 50 with a place value card.)
4. Slide the place value cards together to show the answer in standard form. (Place the 7 card on top of the 0 on the 50 card to show 57.)

<table>
<thead>
<tr>
<th>Expanded Form</th>
<th>Standard Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 0 &lt;br&gt; 2 0 &lt;br&gt; + &lt;br&gt; 5 0 &lt;br&gt; 7</td>
<td>3 2 &lt;br&gt; 2 5 &lt;br&gt; + &lt;br&gt; 5 7</td>
</tr>
</tbody>
</table>

Grade 2 Mathematics ◇ Unit 3 ◇ 2-Digit Addition
Repeat this process using two or three more problems without composing tens and then model the following problem showing how to compose a ten from 10 ones using the cards:

\[
\begin{array}{c}
\text{Expanded Form} \\
30 \quad 9 \\
20 \quad 5 \\
\hline
50 \quad 10 \\
60 \quad 4
\end{array}
\quad +
\begin{array}{c}
\text{Standard Form} \\
10 \\
39 \\
25 \\
\hline
64
\end{array}
\]

Have students repeat the process for addition with regrouping using the place value cards for the following problems: 56 + 38, 24 + 47, 63 + 17.

In their math learning logs (view literacy strategy descriptions), have students explain how to add 2-digit numbers using the concepts of place value. Students should demonstrate a clear understanding that when adding numbers, tens are added to tens; ones are added to ones. When two groups of ones equal ten or more, 10 of them will compose a new 10, and the new ten should be added to the other tens.

**Activity 8: Using Place Value Strategies to Add Two-Digit Numbers (GLEs: 1, 9; CCSS: 2.NBT.7, 2.NBT.9, W.2.2, W.2.8)**

Materials List: 2-Digit Addition Problems BLM, zip top bag, base-10 blocks, math learning logs

Prior to this activity, make multiple copies of the 2-Digit Addition Problems BLM (enough copies so that each student can solve 3-4 different problems). Cut the problems apart and place them in a zip top bag.

After the students have developed a sufficient understanding of the process for adding 2-digit numbers using models and place value cards, connect these processes to written strategies. Students in grade 2 should develop a firm understanding of adding ones to ones, tens to tens, and hundreds to hundreds and “composing” or “creating” new units of 10 (and later creating new units of 100 as numbers get larger) when needed through the use of computational strategies. Demonstrate the following strategies to provide students with further understanding of using place value concepts to add 2-digit numbers. Model the strategies with the base-10 blocks to
connect the students’ concrete understandings to the more abstract strategies. Provide multiple examples and opportunities for students to demonstrate their understanding.

Display the following addition problem:

I won 39 pieces of candy at the carnival. My sister won 25 pieces of candy. How many pieces of candy did we win together?

Model the problem using base-10 blocks. Students may also refer to their math learning log’s (view literacy strategy descriptions) entry from Activity 6 to see their own interpretations and drawings for the problem. Demonstrate the following strategies and allow students to participate in finding the solution to the problem. Have students record these examples in their math learning logs so that they may refer to these strategies in future activities. Note that in the following examples, bold numbers show student work.

**Rewriting the problem in expanded form**
Students rewrite the numbers in expanded form and then add the tens together and the ones together.

\[
\begin{align*}
39 + 25 &= 30 + 9 + 20 + 5 \\
&= 50 + 14 \\
&= 64
\end{align*}
\]

**Recording combined hundreds, tens, and ones on separate lines**
This strategy allows adding the same place value either from left to right or from right to left. The sums for each place are recorded below the problem on separate lines. These sums are then added together to get the total.

\[
\begin{align*}
39 + 25 &= 50 + 14 \\
&= 64
\end{align*}
\]

In this example, the numbers are added left to right. Left to right addition is natural for students because reading is also done from left to right. Adding left to right also allows students to make closer approximations for sums earlier in the addition process.

The example below shows addition from right to left.

\[
\begin{align*}
39 + 25 &= 14 + 50 \\
&= 64
\end{align*}
\]
Recording newly composed units on the same line (below the addends)
In this strategy, students will see that a new ten is composed when adding 9 + 5. This strategy is similar to the standard algorithm that is to be mastered in grade 4, but the newly composed ten is written at the bottom, not placed at the top. In this way, the student is able to write the digits in the usual order (the ten and then the ones) with the digits close to each other. As the student adds the tens column from top to bottom, it will be easier to compute the sums of the larger digits first and then add the newly composed ten.

\[
\begin{array}{c}
39 \\
+ 25 \\
\hline
64
\end{array}
\]

Solve an alternate problem
In this strategy, students can solve a similar, simpler problem and then add or subtract more to compensate for the difference.

\[
39 + 25 \text{ is similar to } 40 + 25
\]

40 + 25 is 65, but the sum of 39 + 25 would be 1 less because 39 is 1 less than 40. So I need to subtract 1 from 65 to get 64. 39 + 25 = 64

Use the associative property
Students can decompose a number and use the associative property to make the addition easier.

\[
\begin{array}{c}
39 \\
+ (1 + 24) \\
\hline
40 + 24 = 64
\end{array}
\]

If I decompose 25 into 24 + 1, I can add the 1 to 39 to get 40. Then I can add 40 and the 24 to get 64.

Guide the students through practicing these strategies for the following problems:

\[
\begin{array}{c}
47 + 4 \\
59 + 26 \\
32 + 18 \\
36 + 48
\end{array}
\]

Provide each pair of students a card from the 2-Digit Addition Problems BLM. Have one partner create a drawing to solve the problem while the other partner uses a strategy to find the solution. After the students have agreed upon a solution, have them work together to write an explanation of their problem and solution. Allow the partners to share their problem and solution with another pair of students. Have the students trade cards with another pair of students and reverse the roles for drawing a solution and solving the problem with a written strategy. Provide opportunities as necessary until students have demonstrated a firm understanding of the concepts and strategies. Students should be encouraged to find a strategy that allows them to solve the problem efficiently and accurately. At this age, students are not expected to master the standard
algorithm, but should employ strategies that assist them in understanding the process of adding multi-digit numbers.

In their math learning logs (view literacy strategy descriptions), have students write an addition problem, draw a representation of the solution, and solve the problem using a computational strategy of their choice. Have the students write an explanation of how to add a 2-digit number. Have them share their explanations with a group. After each student shares, allow the group to determine if the explanation is clear. Students may add to their written explanations to clarify.

Activity 9: Do I Need to Compose a New 10? (GLE: 9)

Materials List: chalk and chalkboard or dry-erase marker and marker board, Will I Compose a New Ten? BLM, pencils

Lead a class discussion to determine that when the sum of two numbers in the ones place is ten or greater, a new ten is composed. When solving problems, it is necessary to recognize when a new ten is created so that it can be recorded and computed accurately. Write three 2-digit addition problems on the board. Call a student to the board to circle the problem/problems that require composing a new ten. Call on different students and have them explain how they would compose a new ten in the circled problems. Have students demonstrate how to solve the problems on the board. Remind students that when the numbers in the ones place total 10 or more, they should compose a new ten to add to the digits in the tens column. Students may choose any written strategy to show how to calculate the sums. Point out where and how the newly composed ten is recorded in the various strategies used (italicized in the examples below).

Example:  

\[
\begin{array}{c}
27 \text{ boys} \\
+ 38 \text{ girls} \\
\hline
65 \text{ children}
\end{array}
\quad \begin{array}{c}
58 \text{ fish} \\
+ 14 \text{ fish} \\
\hline
72 \text{ fish}
\end{array}
\quad \begin{array}{c}
64 \text{ students} \\
+ 23 \text{ students} \\
\hline
87 \text{ students}
\end{array}
\]

Write the following word problem on the board.

*Mark had 25 stickers. His grandma bought him 37 more stickers. How many stickers does he have now?*

Model how to find the information needed to solve the problem. Write the numbers from the problem in vertical addition form on the board and ask students to identify whether they will need to regroup when solving this problem. (Yes.) Review how to solve the problem with regrouping.
Give each student a Will I Compose a New Ten? BLM. Have students write the problem in vertical addition form, circle yes or no to tell if they need to regroup, and solve the problem using the standard algorithm.

**Activity 10: Using Place Value to Find Sums Greater than 100** (GLEs: 1, 9; CCSS: 2.NBT.7)

Materials List: zip-top bags, base-10 blocks, Place Value Cards BLM or bags of place value cards from Activity 7, Composing Tens and Hundreds BLM

Add the hundreds place value cards to the zip-top bags created in Activity 7. Distribute the bags to pairs of students.

Display the following problem:

*Anne earned 63 points while playing a video game. Jerry earned 45 points while playing the game. How many points did they earn altogether?*

Lead a discussion asking students to explain what they think should be done when adding 6 tens and 4 tens. Have students work with a partner using base-10 blocks to model solving the problem. Then have them model the problem using the place value cards. If students are unable to discover that the 10 tens can be traded to compose 100, provide assistance for those partners. Lead students to the conclusion that when the sum of the tens is 10 or more, a new hundred can be composed. Use the following examples to allow more practice with composing a new hundred using base-10 blocks: 72 + 45, 36 + 91, 51 + 50, 47 + 30.

Provide examples that involve composing both tens and hundreds. Allow students to explore the process using the base-10 blocks and place value cards. Students should discover that in some problems it is necessary to compose both a new ten and a new hundred to find the sum of a 2-digit number. Use the following problems as examples: 45 + 55, 36 + 54, 67 + 53, 73 + 47, 56 + 68, 83 + 39. Allow students to work with partners using base-10 blocks, place value cards, drawings, or a written strategy to solve the problems. After completing the solutions with a partner, allow partners to share their solutions with the class. Discuss how different strategies can be used to lead to the correct sum. Ask students to share how they recorded the newly composed ten or hundred in the work.

Give each student the Composing Tens and Hundreds BLM to practice solving word problems. Allow students to solve the problems using a strategy of choice. Give assistance as needed using questioning to lead the student through the correct process. Review the answers together as a class, allowing students to share explanations for their solutions.
Activity 11: Using Place Value to Add Multiple Addends (GLE: 9; CCSS: 2.NBT.7, 2.NBT.9, W.2.2, W.2.8, SL.2.1a, b, c)

Materials List: base-10 blocks, number cubes, Adding More Recording Sheet BLM, math learning logs

Write the following SPAWN writing prompt on the board. Have students copy the prompt in their math learning logs (view literacy strategy descriptions) and allow approximately 10 minutes for students to think and write their response.

Sample SPAWN Prompt:

W- What If?
You have learned how to add two 2-digit numbers. What if you, your sister, and your friend went to a Mardi Gras parade. You caught 23 beads, your sister caught 52 beads, and your friend caught 27 beads. How could you use place value and addition to find how many beads you caught altogether?

SPAWN prompts foster students’ writing in the content areas. SPAWN is an acronym for the following five types of writing: Special Powers, Problem Solving, Alternative Viewpoints, What If?, and Next. These prompts can provide frequent opportunities for students to write in math and other content areas, allowing them to record their predictions, reflections, and critical thinking ideas about the topic of study. Prompts that ask students to make predictions about the lesson should be presented before the lesson is taught; reflective prompts should be presented after students have learned the new information.

After allowing time for students to complete their response, place students into groups of 4 to share their ideas. Have the other students listen for logic and accuracy as each student shares. Allow students to explore their ideas using base-10 blocks to represent the numbers of beads. Students may add to or revise their SPAWN writing responses as they discuss and explore the problem with their group. Allow students to share their solutions with the class.

Model writing the numbers 23, 52, and 27 vertically to add, aligning the ones and tens. The students may use column addition to add the ones first. Ask students to choose use a fact strategy to add 2 numbers in the ones place. Circle the numbers that they choose to add first, and then add the third number. If the total for the ones is 10 or greater, they will need to make a record of the newly composed ten at the bottom of the tens column. Now add the tens using a fact strategy to help them add. Notice that in this problem, the tens add to 10 tens so a new hundred is composed.
Students may use other methods that show understanding of place values. One example could be using left to right addition of the first two numbers and adding the third number to the sum of the first two numbers.

\[
23 + 52 + 27 = 23 + 52 + 75 - 27 = 70 + 12 = 82
\]

Demonstrate more examples of adding three and four two-digit numbers: \(27 + 39 + 58\), \(42 + 28 + 35 + 45\), \(63 + 26 + 71 + 48\). Students may use base-10 blocks or drawings to verify the sums. Have students discuss the strategies used to add the numbers.

Divide the class into groups of 3 or 4. Provide each group 2 number cubes and an Adding More Recording Sheet BLM. Have each student roll the two number cubes and record his/her roll as a 2-digit number in the first chart. Have the students work together to add the numbers using strategies to help them add. Have the students complete 4 examples as a group.

**Activity 12: Flip 4 (GLEs: 9)**

Materials List: 2 sets of Digit Cards BLMs per pair, Flip 4 BLM, Flip 4 Recording Sheet BLM, paper, pencil

Tell the students that they will play a game with partners. Have students take turns selecting 4 digit cards. Each student will use his/her digit cards to create two 2-digit numbers. Each student will add the two numbers he/she created. Together they will compare the two sums. For each round, the partner with the highest sum will earn one point. If the students have the same sum, both students will earn one point.

Prior to playing the game, have students fill out an *anticipation guide* (view literacy strategy descriptions) Flip 4 BLM. The *anticipation guide* will help students to think about the strategies that they might use while playing the game. Before playing the game, students fill in the “top” half of the BLM.

Put students into pairs. Give each pair 2 sets of digit cards. Have them follow the instructions stated in paragraph 1 above. Have each student record his/her work and points on the Flip 4 Recording Sheet BLM. Play continues until one player earns 5 points.

After a student in each pair reaches 5 points, have students return to the guide and fill in the “bottom” half. Discuss students’ answers. Students should develop the understanding that they should place the two greatest digits in the tens places in order to create the greatest sum. Lead the students in a class discussion to allow them to share their strategies using their understanding of place value.
Activity 13: Numbers with Sums of 100 (GLEs: 1, 8, 9)

Materials List: paper, pencil, math learning log

Draw a large circle on the board, and place 2-digit numbers randomly inside it so that when 2 are added, they will equal 100. Be sure to include some pairs of numbers that will NOT equal 100 and also include three numbers so students can discover using 3 numbers that add to 100 as well. (Example 30, 20, and 50). Students should work quickly and can use numbers more than once. After two minutes, call time and compare answers. Allow students to share tips and strategies for finding sums of 100. Play again using different numbers to allow students to increase their speed.

Give students 5 minutes to write down as many 2-digit plus 2-digit numbers that have a sum of 100 in their math learning logs (view literacy strategy descriptions). Have students share their findings and discuss their strategies using place value vocabulary.

Sample Assessments

Performance and other types of assessments can be used to ascertain student achievement. Following are some examples:

General Assessments

- Provide a word problem and have the student use base-10 blocks to model the problem. Observe if the student knows when and how to regroup.
- Write ten addition problems in context using 2-digit numbers for the student to solve correctly using concepts learned.
- Observe as the student uses different problem-solving strategies such as guess and check, draw a picture, or make a chart to find the answers to math story problems.
Activity-Specific Assessments

- **Activity 5**: Have students use a number line to find the sum for the following problems:
  
  \[40 + 65\] \[34 + 50\] \[27 + 31\] \[64 + 13\] \[45 + 38\] \[27 + 67\]

- **Activities 6, 7 & 8**: Provide students with 2-digit addition problem situations. Have students use models, drawings, and/or strategies to solve the problems.

- **Activity 11**: Provide students an Adding More Recording Sheet BLM and 2 number cubes. Have students roll the number cubes 3 or 4 times, record their two-digit numbers, and find the sum. Have students circle the numbers they chose to add first in each column based on known addition strategies.

- **Activity 13**: Place several 2-digit numbers that have a sum of 100 randomly inside of a rectangle. Have the student find as many number combinations with a sum of 100 as he/she can.
2012-13 Transitional Comprehensive Curriculum

Grade 2
Mathematics
Unit 4: 2-Digit Subtraction

Time Frame: Approximately three weeks

Unit Description

This unit extends students’ knowledge of subtraction and place value to the subtraction of 2-digit numbers.

Student Understandings

Students understand place value and properties of operations and use this knowledge to develop methods for computation within the base-10 system. Students mentally subtract numbers with only tens or hundreds. Students use their understanding of subtraction to fluently subtract 2-digit numbers within 100. Students solve problems involving money using the $ and ¢ symbol appropriately.

Guiding Questions

1. Can students mentally subtract numbers with only tens or only hundreds?
2. Can students subtract 1-digit and 2-digit numbers with and without regrouping?
3. Can students solve 2-digit subtraction word problems within 100 involving one-step or two-step operations?
4. Can students solve subtraction problems with money using the $ and ¢ symbol appropriately?

Unit 4 Grade-Level Expectations (GLEs) and Common Core State Standards (CCSS)

<table>
<thead>
<tr>
<th>GLE #</th>
<th>GLE Text and Benchmarks</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Model, read, and write place values for numbers through 999 in word, standard, and expanded form (N-1-E)</td>
</tr>
<tr>
<td>8.</td>
<td>Recognize, select, connect, and use operations, operational words and symbols (+, −) for addition (join, part/part/whole) or subtraction (take away, comparison, missing addend, and set/subset) situations (N-6-E) (N-5-E)</td>
</tr>
<tr>
<td>9.</td>
<td>Add and subtract 1- and 2-digit numbers (N-6-E) (N-7-E)</td>
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<tr>
<td>CCSS #</td>
<td>CCSS Text</td>
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<tr>
<td>--------</td>
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<tr>
<td><strong>Numbers and Operations in Base Ten</strong></td>
<td></td>
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<tr>
<td>2.NBT.7</td>
<td>Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.</td>
</tr>
<tr>
<td>2.NBT.8</td>
<td>Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.</td>
</tr>
<tr>
<td>2.NBT.9</td>
<td>Explain why addition and subtraction strategies work, using place value and the properties of operations.</td>
</tr>
<tr>
<td><strong>Measurement and Data</strong></td>
<td></td>
</tr>
<tr>
<td>2.MD.6</td>
<td>Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, … , and represent whole-number sums and differences within 100 on a number line diagram.</td>
</tr>
<tr>
<td>2.MD.8</td>
<td>Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately.</td>
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<tr>
<td><strong>ELA CCSS</strong></td>
<td></td>
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<tr>
<td><strong>Writing Standards</strong></td>
<td></td>
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<tr>
<td>W.2.1</td>
<td>Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons to support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or opinion.</td>
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<tr>
<td>W.2.2</td>
<td>Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.</td>
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<tr>
<td><strong>Speaking and Listening Standards</strong></td>
<td></td>
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<tr>
<td>SL.2.1</td>
<td>Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups. a. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion). b. Build on others’ talk in conversations by linking their comments to the remarks of others. c. Ask for clarification and further explanation as needed about the topics and texts under discussion.</td>
</tr>
</tbody>
</table>
Sample Activities

Activity 1: 10 Less, 100 Less (GLE: 1; CCSS: 2.NBT.8)

Materials List: large digit card rings (from Unit 3, Activity 1), base-10 blocks, Place-Value Spinner BLM, Connect 4 BLM, two-color counter, dry erase boards, dry erase markers, sock erasers, paper clips, and pencils

If individual dry erase boards are not available, laminate construction paper or place a piece of paper in smooth page protectors. Students may write on these with a dry erase marker and then erase using a sock eraser as described in Unit 1.

Using base-10 blocks, show 3 flats, 5 rods, and 6 units. Use the large digit card rings created in Unit 3, Activity 1 to display the digits for the number of blocks shown. Remove 1 ten from the set and ask students to tell how many blocks are left. Flip the cards in the tens place to show that there are now 4 tens. Ask the students to describe how the number changed when a ten was subtracted. Repeat the process in the hundreds place by removing one flat to leave 2 hundreds. Complete additional examples, allowing the students to discuss their understanding that subtracting a ten or a hundred will, in most cases, only change the digit with the corresponding value. (It will change the hundreds digit if the original number contains no tens. For example, 201 – 10, will change the hundreds place.)

Place the students in pairs. Give each pair of students a dry erase board and marker, a Place-Value Spinner BLM, a paper clip, a pencil, a two-color counter, and a Connect 4 BLM. Select a partner to go first. Have the first student spin the spinner to create a 2 or 3-digit number and write it on a dry erase board. Have the student then flip the two-color counter. If the counter lands on red, the student will subtract 10 from the number created and change the number on the dry erase board. If the counter lands on yellow, the student will subtract 100 from the number created and change the number on the dry erase board. If the student subtracts correctly, he/she will record his/her initials in a circle on the Connect 4 BLM. Have the second student take a turn to spin a number and subtract 10 or 100. If correct, that student will record his/her initials in a space on the Connect 4 BLM. The object of the game is to connect 4 spaces in a row (horizontally or vertically) with the same initials. Play will continue until one student has his/her initials recorded in 4 adjacent spaces.

After students have completed the game, have them write an explanation in their math learning logs to tell how subtracting 10 or 100 from a number changes the number. Allow students to share their explanations with the class.

For additional practice subtracting 10 or 100 mentally, play “Count Down/Count Up.” Say: “I’m going to say a number from 100 to 900. You say the number that is ten less as quickly as you can.” Set a quick pace for this game so students become reflexive at adding and subtracting 10 and 100 to a number. Call out 213. (Students answer 203.) Call out 366. (356) Call out 507. (497) Continue calling out numbers. Do the same activity for subtracting 100, adding 10, and adding 100. Repeat this activity often as a quick warm-up.
Activity 2: Counting Back by 10 (GLEs: 1, 9; CCSS: 2.NBT.7, 2.NBT.8)

Materials List: large number line from Activity 5 in Unit 3, Hundreds Chart BLM, base-10 rods and flats, one color tile per student, Place-Value Spinner BLM, paper clip, pencil, 8 sticky notes with arrows drawn on them (or sticky note flags)

Display the large number line created in Activity 5 of Unit 3. Have students locate the tens (10, 20, 30, etc.) on the number line. Model counting back by tens on the number line, starting from 100. Remind students that counting back is a way to subtract. Have a student locate 80 on the number line. Tell the student to subtract 20 by making two tens jumps backward on the number line. Have the class count back while the student models on the number line. Repeat the activity with the following examples: 90 – 60, 80 – 40, 50 – 10.

After students are comfortable subtracting by tens starting at a multiple of ten (10, 20, 30, etc.), model how to count back by tens from any given number. Have a student locate 78 on the number line and place a sticky note arrow to point to the number. Guide the student to count ten spaces back to 68 and place another sticky note to point to the number. Continue to count back ten more spaces to find the number 58 and place another sticky. Ask the class to describe any patterns they notice in the numbers. (The tens place changes but the ones place stays the same). Ask the students to predict the next number that would be found if ten more were subtracted. Have the student count back ten more and mark the number 48 with a sticky note. Continue until the number 8 is reached, then have the students start at 78 and count back by ten saying all of the marked numbers aloud. Repeat the process using the following subtraction problems and having students make the jumps by ten: 55 – 20, 69 – 40, 95 – 50.

Provide each student with a Hundreds Chart BLM, 10 base-ten rods, and a color tile (or a small token to use as a board game piece). Pair the students with partners and give each pair a paper clip, a pencil, and a Place-Value Spinner BLM. Have each student place his/her color tile on the 100 space of his/her hundreds chart and display the ten base-10 rods next to his/her chart. Taking turns with the partner, each student will spin the tens spinner. According to the number they spin, students will remove base-10 rods and move their color tile to the correct space on their hundreds chart. Have the students count back orally as they remove the rods and move their color tiles. If students spin a number larger than the number of tens that they have left, they will not subtract any of the rods and will not be able to move their color tile. The first student to end up with one ten wins.

Using just the spinner and color tile, repeat the activity having students start their color tile on a random number in the 90s, such as 97. The students will spin the tens spinner and count back by tens to subtract the tens from their number. If the student spins 30, the student would count 87, 77, 67. If there are not enough spaces to count back by tens, the student will not subtract and will not move his/her color tile. The first student to reach a 1-digit number wins.
Activity 3: Number Line Subtraction (GLEs: 8, 9; CCSS: 2.NBT.7, 2.NBT.9, 2.MD.6, SL.2.1a-c)

Materials List: large number line from Activity 5 in Unit 3, number lines from Activity 5 in Unit 3 or Student Number Line BLM (2 pages), counters, Common Addition and Subtraction Situations BLM (teacher reference), Four Jobs Mat BLM, Word Problem Cards BLM, math learning logs

Prior to the lesson, prepare enough copies of the Student Number Line BLM for each pair of students. Students may use the number lines that were previously created in Unit 3, Activity 5 if available.

Display the large number line created in Unit 3, Activity 5. Review with the students that a number line can be used to find the difference between two numbers. Display 12 - 6 and ask students to discuss with partners how they could use the number line to find the difference. Ask volunteers to share their idea with the class.

Present students with the following word problem:

There were 45 students on the bus. 23 students got off. How many students were still on the bus?

Distribute the student number lines and a color tile to pairs of students and have the students work with their partners to solve the problem. Observe as students discuss and work out the problems with their partner. Some students may choose to subtract tens first while others subtract the ones first. Some students may count back by ones. Allow students to share their different methods for finding the difference. Remind students that just as they were able to skip count forward by tens to add, they can also skip count backward by tens to subtract.

The process for subtracting on a number line may be represented differently for the different subtraction situations found on the Common Addition and Subtractions BLM. Model three ways to subtract using a number line with the following problem: 46 - 24. For easy reference, the examples are identified as Model 1, Model 2, and Model 3 in the Teacher Notes below. Remember that students are not required to know the names of each subtraction situation.


Teacher Note: Model 1 can be used for Take From: Result Unknown; Add to: Start Unknown, and Compare: Smaller Unknown subtraction situations found on the Common Addition and Subtraction Situations BLM.
Model 2: Start at 46. Jump back by tens (two jumps) to 26. Jump back by ones (2 jumps) to 24. Count the jumps to find the difference (22).

*Teacher Note:* Model 2 can be used for *Take From: Change Unknown and Compare: Difference Unknown* subtraction situations found on the Common Addition and Subtraction Situations BLM.

Model 3: Students could also think of 46 – 24 as 24 + ? = 46. They may think, “How many do I need to add to 24 to get to 46?” To show this, students start at 24 and make jumps by tens and ones to 46. Count the jumps to find the difference (22).

*Teacher Note:* Model 3 can be used for *Add To: Change Unknown; Take Apart: Addend Unknown, and Compare: Difference Unknown* subtraction situations found on the Common Addition and Subtraction Situations BLM.

Display the following problems on the board and have students work together to model them using the number line to find the differences. Make sure students model each problem using all three models above.

- 85 – 30
- 73 – 40
- 54 – 39
- 92 – 22
- 56 – 31

When students are comfortable with using all three number line models to subtract 2-digit numbers, review other types of common addition and subtraction situations from the Common Addition and Subtraction Situations BLM (teacher reference). Present the following problem to the students:

Julie has 84 stickers. Mark has 56 stickers. How many more stickers does Julie have?

Have students work with their partner to find the difference using the number line. Allow groups to share how they used the number line to solve the problem.

*Teacher Note:* This is an example of a *Compare: Difference Unknown* situation and could be modeled using Number Line Model 3.

Place the partners into groups of 4. Give each group a copy of the Word Problem Cards BLM (pre-cut and stored in zip-top bags), a Student Number Line BLM (pre-assembled), and the Four Jobs Mat BLM. The students will place the Four Jobs Mat BLM in the center of the group with each student sitting in front of a job. Following is a description of the jobs:
1- Fanner: This student will hold the cards in a fan and announce “Choose a card, any card!”
2- Reader: This student will select a card and read it aloud to the group.
3- Solver: This student will solve the problem on the card using a student number line.
4- Coach: This student will coach the solver by providing hints, encouragement and compliments as needed.

When the first round is complete, have the students rotate the Four Jobs Mat BLM and repeat the activity with each student assigned to a new job.

After all of the students have had a chance to perform each job, have each student select a final card. Each student will copy the word problem that is on the final card in his/her math learning log (view literacy strategy descriptions). Have the student solve the problem and illustrate how to solve it on a number line. Have each student share his/her problem and solution with the group. Group members should listen for accuracy and completeness and suggest further explanation if needed. The student may revise or add information to his/her response.

Activity 4: Modeling Subtraction (GLEs: 1, 8, 2; CCSS: 2.NBT.7)

Materials List: base-10 blocks, Place-Value Mat BLM, Modeling Subtraction Problems BLM, math learning logs

Display the following problem:

Marcus has 33 trading cards. He gives Alonzo 17 cards. How many cards does he have left?

Guide students through the problem. Ask, “Which operation is needed to solve this problem?” (subtraction) Ask students to consider how they would use the base-ten blocks to model the problem. Instruct students to model the number 33 on their Place-Value Mats. Ask the students to notice how many tens and ones they have in the first number (3 tens and 3 ones) and how many tens and ones they need to remove (1 ten and 7 ones). Ask students to turn and talk to a partner about how they can take away 1 rod and 7 units from 3 rods and 3 units allowing them time to try out their ideas using the base-10 blocks. After a few minutes, allow students to share what they discovered about how they could subtract 17 from 33. Discuss with students that if there are not enough units, a ten can be decomposed, or broken apart, to get more ones from which to subtract. Demonstrate how to take a rod from the tens place and exchange it for ten units. Place the ten units in the ones place on the Place Value Mat. Have the students make this exchange as well and then count the number of rods and units to confirm that they still have 33. Thirteen units is the same as 1 ten and 3 units, so with the 2 rods still remaining in the tens place, there are still 33 blocks. Ask a student to explain what can be done now to complete the subtraction process. Students should remove 7 units and one rod from the place value mat. Have students count the remaining rods and units to tell how many cards Marcus has left.

Repeat this activity many times using different problem situations. Make multiple copies of the Modeling Subtraction Problems BLM and cut them apart as cards. Allow students to select problems and work with a partner to solve the problems using base-10 blocks and drawings.
Give students at least one day of practice in which they use manipulatives to model the process of decomposing tens in subtraction without recording the problems in written form. Then provide additional practice allowing students to draw base-10 representations for decomposing tens to subtract.

Have the students record one problem in their math learning logs (view literacy strategy descriptions) and write an explanation for the solution expressing how to decompose the tens.

**Activity 5: Expanded Form Subtraction (GLEs: 1, 9; CCSS: 2.NBT.7, 2.NBT.9, W.2.2)**

Materials List: zip-top bags, Place Value Cards BLM, Expanded Form Subtraction Mat BLM, math learning logs

Prior to the lesson, copy and cut apart a set of the Place Value Cards BLM (tens and ones only) for each student. Store each set in a zip-top bag. These cards can be used to represent the expanded form of a number as well as the standard form. To show the standard form, the arrow ends of the cards should be aligned evenly together.

Display the following problem: 57 – 23 = ___.

Give each student a bag of place value cards and an Expanded Form Subtraction Mat BLM. Have the student show the number 57 using the place value cards on the Expanded Form Subtraction Mat. Have students lay the 50 card and the 7 card in the corresponding places on the top row of the mat. Review how to slide the cards together to create the standard form and separate the cards to create the expanded form. Have the students display 23 using the 20 card and the 3 card, reviewing how to show the standard and expanded form with this number. Guide students in subtracting the two numbers using the place value cards:

1. Separate the cards to show the expanded form.
2. Subtract the ones: 7 – 3 = 4 (Show 4 with a place value card.)
3. Subtract the tens: 50 – 20 = 30 (Show 30 with a place value card.)
4. Slide the place value cards together to show the answer in standard form.

<table>
<thead>
<tr>
<th>Expanded Form</th>
<th>Standard Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 0 7</td>
<td>5 7</td>
</tr>
<tr>
<td>2 0 3</td>
<td>2 3</td>
</tr>
<tr>
<td></td>
<td>3 4</td>
</tr>
</tbody>
</table>

Repeat this process using the following problems: 84 – 30, 25 – 12, 67 – 47.
Display the problem 62 – 38 and model how to decompose the tens using the place value cards:
1. To subtract the ones, more ones are needed.
2. 60 can be broken down into 50 and 10.
3. Place the 50 card on top of the 60 card.
4. Add the 10 card with the 2 card to get 12 ones. Subtract 12 – 8. (4)
5. Subtract 50 – 30. (20)

Have students repeat the process using the place value cards for the following problems: 62 – 46, 37 – 19, 50 – 27.

In their math learning logs (view literacy strategy descriptions), have students explain how to subtract 2-digit numbers using the concepts of place value. Students should demonstrate a clear understanding that when subtracting numbers, tens are subtracted from tens; ones are subtracted from ones; and when there are not enough ones from which to subtract, a ten can be decomposed to create more ones. Have the students share their explanations with the class.

Activity 6: Place Value Strategies for 2-Digit Subtract (GLEs: 1, 9; CCSS: 2.NBT.7, 2.NBT.9, W.2.1)

Materials List: base-10 blocks, chart paper, marker, dry erase boards and makers, sock erasers, Subtraction Problems BLM, math learning logs

Prior to this activity, make enough copies of Subtraction Problems BLM so that there is at least 1 problem per pair of students.

In this activity, students use written strategies along with drawings and diagrams to relate place value understanding to subtraction. These strategies help students develop a deeper understanding of the process of subtraction as they connect numerals with place value quantities and determine the need to decompose tens to create more ones before moving to the abstract algorithm. At this age, students should develop fluency in subtracting numbers within 100 using strategies based on place value concepts; however, they are not expected to apply the standard algorithm until grade 4.

Display the following problem:

Paul has 54 cookies in his pack. He and his friends ate 28 cookies. How many cookies does he have left?
Demonstrate the following strategies and allow students to participate in finding the solution to the problem.

**Rewriting the problem in expanded form**

Students rewrite the numbers in expanded form, decompose tens as needed, and then subtract tens from tens and ones from ones.

**Step 1:** Rewrite the numbers in expanded form.

\[
\begin{align*}
54 & = 50 + 4 \\
-28 & = 20 + 8
\end{align*}
\]

**Step 2a:** Check the tens and ones to see if they can be subtracted.

\[
\begin{align*}
54 & = 50 + 4 \\
-28 & = 20 + 8
\end{align*}
\]

There are not enough ones to subtract 8, so it is necessary to decompose a ten to get more ones.

**Step 2b:** Decompose tens to get more ones.

\[
\begin{align*}
40 & \quad 14 \\
54 & = 50 + 4 \\
-28 & = 20 + 8
\end{align*}
\]

**Step 3:** Subtract left to right or right to left.

\[
\begin{align*}
40 & \quad 14 \\
54 & = 50 + 4 \\
-28 & = 20 + 8 \\
20 & + 6 = 26
\end{align*}
\]

**Decomposing where needed first**

Students create visual and numerical representations and complete all necessary decomposing before calculating the difference. Decomposing and subtracting can be done left to right or right to left.

**Step 1:** Perform all necessary decomposition left to right or right to left (notated in green).

\[
\begin{align*}
\begin{array}{c}
4 \quad 14 \\
\hline
54 \\
\hline
-28
\end{array}
\end{align*}
\]

**Step 2:** Subtract left to right or right to left (notated in red).

\[
\begin{align*}
\begin{array}{c}
4 \quad 14 \\
\hline
54 \\
\hline
-28
\end{array}
\end{align*}
\]
Adding up to find the difference
Students rewrite the problem as an addition problem with an unknown addend and add on tens and ones to find the difference.

Step 1: Rewrite the problem as an addition problem with an unknown addend.

\[28 + \_\_\_ = 54\]

Step 2: Add on ones and tens.

\[28 + \_\_\_ = 54\]
\[28 + 2 = 30\]
\[30 + 20 = 50\]
\[50 + 4 = 54\]

Step 3: Combine what was added on to find the solution

\[28 + \_\_\_ = 54\]
\[28 + 2 = 30\]
\[30 + 20 = 50\]
\[50 + 4 = 54\]
\[\underline{26}\]

Solve a similar problem
Students solve a simpler problem and add or subtract to compensate.

Step 1: Think of a simpler problem.

\[54 - 28\text{ is close to } 54 - 30\]
\[54 - 30 = 24\]

Step 2: Compensate by adding or subtracting more.

Since 30 is 2 more than 28, 2 must be added back to the difference.
\[24 + 2 = 26\]

Guide students to practice these strategies by completing the following computations:

\[80 - 23\quad 82 - 45\quad 91 - 38\quad 32 - 19\]

Provide pairs of students with a subtraction problem from the Subtraction Problems BLM and two dry erase boards, markers and sock erasers. Have each partner choose a different strategy to use for finding the solution to their problem. After both partners have completed their work, have the partners compare their solutions for the problem. The partners should discuss the similarities and differences in their solution strategies. If the partners did not calculate the same difference,
have them check each other’s work to determine where an error may have been made. Allow the partner who made the error an opportunity to correct it.

Reassign partners and allow the students to work with new partners. Students should select a different strategy to solve the second problem. Have the students compare and discuss the results with their new partner.

In their math learning logs (view literacy strategy descriptions), have students select their preferred strategy for subtraction. Have the students use their preferred strategy to find the difference for 83 – 56. Have the students write an explanation of how they used the chosen strategy to find the solution and why they prefer to use this strategy over the others. Allow students to share their opinion pieces with the class. Students should demonstrate an understanding of place value and properties of addition and subtraction through their written explanations.

Activity 7: Thumbs Up to Break Up! (GLEs: 8, 9; CCSS: 2.NBT.7, 2.NBT.9, SL.2.1a-c, W.2.2)

Materials List: Digit Cards BLM, small dry erase boards and markers for each student, sock erasers, math learning logs,

Review with students the importance of first determining if it is necessary to break up, or decompose, a ten in order to subtract the ones. Draw a base-10 model drawing of 45. Display the following subtraction problems on the board.

\[
\begin{align*}
45 & - 32 \\
45 & - 38
\end{align*}
\]

Ask students to identify which problem would require a decomposition of the tens and to explain why (45 – 38 because you cannot remove 8 from 5 ones).

Guide students to use questioning the content (QTC) (view literacy strategy descriptions) as they consider each problem. QTC teaches students that they should ask questions as they read in order to construct meaning and develop higher levels of thinking about the information from which they are expected to learn. The teacher and class collaboratively interact to build understanding as they read and discuss the content. To implement QTC, provide students with a list of questions or types of questions they should ask, model the questioning process by demonstrating how to apply the questions to what the students are learning, and then allow students to work in pairs to practice the questioning. Provide monitoring, support and clarification as needed. The questioning process should become more automatic as students practice so that they can begin using it on their own.

The following questions are samples that may be used for QTC in a subtraction story problem involving 2-digit numbers. Write these questions on chart paper and display them in the
classroom. While reading and working through story problems, model asking these questions to think through the information that should be considered before working out the problem.

Is this a subtraction problem?
Which number is larger? (It is written on the top.)
Which number is smaller? (It is written on the bottom.)
Do I need to decompose tens before I subtract?

While modeling, make it clear that before beginning a problem, students should review the amounts for each place value location to determine if it is necessary to decompose any of the numbers. Hang the chart on the wall so that students may refer to it as they work through problems.

Divide the class into two teams, making sure to create teams with a mixed level of proficiency. Flip over 4 digit cards and challenge students to use each of the digits on the cards to think of a subtraction problem that can, but does not have to, require decomposing a ten. Have a student from each team come to the front of the room and write a problem on the board using the digits. When both problems are written, check to be sure that they are appropriate problems for 2nd grade students (i.e. no negative differences). Allow students time to consider the questions presented in the QTC chart. Then call “GO!” The students at the board will solve their problems while the remaining students will write their team’s problem on their individual boards and find the difference using a strategy learned. When students have finished, call out “Thumbs Up to Break Up!” The team members will show thumbs up if their problem required breaking up a ten to create more ones and a thumbs down if it did not require decomposing a ten. Check the problems for the students at the board. If their answer is correct, they will earn one point for their team. (Two points may be awarded if the problem requires decomposing). If their answer is not correct, select a seated student from the team to “save” the team by showing his/her answer on the individual board. If the answer is correct, that student has helped the team earn its point. If the answer is not correct, the team does not earn a point. Show the correct way to solve the problem if needed. Continue playing as time permits or until all students have had a turn to write a problem on the board.

Have students write and answer the following questions in their math learning logs (view literacy strategy descriptions):

Compare and contrast what happens to the number 34 in the problems 34 – 27 and 34 – 22. How are the problems alike? How are they different?

Use “Think Pair Square Share” discussion (view literacy strategy descriptions) to allow students to share their answers. In this form of discussion, students first think individually about their response to a question, problem or prompt. They are then paired with a partner to discuss and compare their ideas. This pair of students will form a square of four students by joining another pair of students to extend the discussion. Finally, groups share their responses and explanations with the class. Students may add more information to the answers in their learning logs after discussing their ideas with their partners and hearing responses and explanations from their classmates.
Activity 8: Can You Buy It? (GLEs: 8, 9; CCSS: 2.NBT.7, 2.MD.8)

Materials List: classroom money (10s and 1s bills), envelopes, 0 – 9 Spinner BLM, paper clip, Toy Prices BLM, dry erase boards, markers, sock erasers

Present the following problem to students:
Molly has $20. She wants to buy a CD that costs $18. Does she have enough money to buy the CD?

Model $20 with 2 ten-dollar bills. Ask a student to come up and remove $18. When there are no ones to remove, have the student trade a 10-dollar bill for 10 ones. Then have the student remove 8 ones and 1 ten. Molly has enough money to buy the CD because 20 is greater than 18. The students will determine how much greater when they see how much Molly has left. Explain to students that subtracting dollars is just like subtracting any other problem. Demonstrate how to record the problem in standard form using the $.

Give each pair of students a Toy Prices BLM and an envelope labeled “BANK” containing 10 ten-dollar bills and 10 one-dollar bills. Using the 0 - 9 Spinner BLM, Partner A will spin a number and take that number of ten-dollar bills from the bank. He/she will select an item from the Toy Prices BLM and give the tens to Partner B. Partner B will use the classroom money to model the problem, trading a ten for ten ones as needed, and then give the change back to Partner A. Partner A will solve the problem on an individual dry erase board to determine how much money he/she should get back and then check the change for accuracy (see Activity 5 for instructions on how to make individual boards).

Example: Partner A spins a 6. The student takes $60 from the BANK to spend at the toy store. He/she selects a robot from the toy list that costs $48. Partner A gives the $60 to Partner B. Partner B trades a $10 for ten $1s. Partner B subtracts four $10s and eight $1s. Partner B will give Partner A back one $10 and two $1s in change. Partner A will check his/her change solving the problem on a dry erase board using a drawing or computation strategy.

Repeat the activity several times allowing partners to switch roles for each round.

Activity 9: Adding and Subtracting Word Problems (GLEs: 8, 9; CCSS: 2.NBT.7)

Materials List: dry erase boards and markers, sock erasers, Two-Step Word Problems BLM

In this activity, students will review problem solving situations for both addition and subtraction using 2-digit numbers and apply problem solving strategies to two-step problems. Present the following problem to the students:

Mom baked 38 strawberry cupcakes and 49 chocolate cupcakes for the party. 19 cupcakes were left at the end of the party. How many cupcakes were eaten?
Discuss the problem with the students. Guide the students to conclude that this problem requires two steps to find the final solution. In the first step, the students add to find the total number of cupcakes. In the second step, they subtract that result to find the amount eaten. Allow students to work with partners to solve the problem. Have them divide a dry erase board into two sections. In the first section, have the students add 38 and 49 to find the total number of cupcakes. In the second section, have the students subtract 19 from the total number of cupcakes to find the amount eaten. After students have completed their calculations, allow them to share the strategies they used and explain their answers with the class.

Repeat this process with the following two-step problems. Students may use any logical strategy to solve these problems.

We ordered cheese, pepperoni, and sausage pizzas for the second grade party. There were 96 slices in all. There were 24 cheese slices and 40 pepperoni slices. How many slices of sausage pizza did we order?

*Teacher Note: Students may solve this problem by subtracting 24 from 96 and then subtracting 40 from the difference: 96 – 24 = 72, 72 – 40 = 32; or they may subtract the sum of 24 and 40 from 96: 24 + 40 = 64, 96 – 64 = 32.*

We had 42 grape drinks. There were 29 more cherry drinks than grape. How many cherry drinks did we have and how many drinks were there in all?

*Teacher Note: Students will need to determine the number of cherry drinks first by adding 42 and 29; then students will add 42 to the sum of 42 and 29 to find the total number of drinks: 42 + 29 = 71 cherry drinks, 71 + 42 = 113 drinks in all.*

Allow the students to share their solutions with the class. If a pair of students followed a different process, allow them to explain their thinking and solution. Accept all reasonable and accurate responses.

Provide each student with a Two-Step Problems BLM. Have the student complete the problems independently using drawings and preferred strategies. After students have completed their problems, place them in groups of 4 to compare and discuss their solutions. Encourage students to validate the responses of others who may have solved the problem in a different way but still found the same answer. Invite students to share why the answers are the same even though the problem was solved in a different way. If students came up with a different calculation, the group should review the work and determine where an error might have occurred. The group members should offer suggestions for correcting the calculation error (ex. you should have subtracted that number, you forgot to decompose your ten, etc.).
Activity 10: Sports Math (GLEs: 8, 9; CCSS: 2.NBT.7)

Materials List: sports page, poster board or bulletin board, Basketballs and Footballs BLM, library pockets

Using the sports page from a newspaper, show students how to find scores. Place students into groups of four. Have the groups find football or basketball scores for their favorite teams. Give each group of students a piece of construction paper folded in half width-wise. Have each group write an addition or subtraction problem in the form of a text chain (view literacy strategy descriptions). Tell the students to turn the folded edge to the top and write their text chain on the outside of the construction paper. On the inside, have the students write the answer to the problem in a complete sentence.

Examples of text chain:

Student 1: The Saints scored 45 points.
Student 2: The Lions scored 28 points.
Student 3: How many more points did the Saints score than the Lions?
Student 4 (inside): The Saints scored 13 more points than the Lions.

Student 1: The Hornets scored 19 more points than the Celtics.
Student 2: The Celtics scored 78 points.
Student 3: How many points did the Hornets score?
Student 4 (inside): The Hornets scored 97 points.

Display the problems along with library pockets labeled with students’ names on a poster board or bulletin board entitled Sports Subtraction. Place an additional library pocket on the board and fill it with blank basketball and football cut-outs from the Basketballs and Footballs BLM. Assign each problem a score (ex. problems that require decomposing a ten earn 3 points; problems that do not require decomposition earn 2 points). Invite students to visit the board and select a problem to solve. The students will record the problem and the solution on a basketball or football pattern. They can check their answers by lifting the front flap. If the student answered the problem correctly, he/she may write the assigned score on the back of the ball pattern and place it in his/her library pocket. If the problem were not answered correctly, the student should discard the ball and try the problem again another day. Throughout the remainder of the unit, select days for students to visit the board and answer another Sports Subtraction problem. At the end of the unit, allow the students to collect the balls from their pockets and find their total scores.
Sample Assessments

Performance and other types of assessments can be used to ascertain student achievement. Following are some examples:

General Assessments

- Problem Solving Book: Have students make a class problem solving book. Each student will write a problem in which he/she finds the difference between two numbers that requires regrouping and write the answer on the back of the page. Make a booklet and place it in a center for students to solve each other’s problems.
- Journal Writing: Have students explain how addition and subtraction are alike and how they are different. Have students explain how they know when to regroup in a subtraction problem.
- Have students determine if they would use addition or subtraction to solve problems as story problems are read to them.

Activity-Specific Assessments

- **Activity 2**: Have students model a subtraction problem using a number line. Have them fill in the blanks as the work is done and then write a subtraction number sentence for their problem.
  
  I started at ________. I jumped back _____ tens. Then I jumped back ______ ones.
  
  I ended up on the numeral ____.

  ____ − ____ = ____

- **Activity 4**: Have students write and solve a 2-digit problem using the digits 2, 4, 7 and 9 that would require decomposing a ten.

- **Activity 8**: Given an amount of $70, have students select one of the items below to “purchase.” Have students subtract to find how much change they will receive.

  Video game $37  Camera $41  CD $21
Time Frame: Approximately four weeks

Unit Description

This unit extends number and operation skills as students count money using dollars and mixed coins and tell time to the nearest 5 minutes. Students also solve problems involving money and elapsed time (one hour before and one hour after).

Student Understandings

Students should be able to recognize and count coins and dollars and solve problems involving money. They will tell time to the nearest 5 minutes and indicate their understanding of elapsed time by stating the time one hour before and after a given time.

Guiding Questions

1. Can students find and write the value of coins and one-dollar bills?
2. Can students solve addition and subtraction problems involving dollars and cents using the $ and ¢ symbols appropriately?
3. Can students tell time to the nearest 5 minutes?
4. Can students solve problems involving elapsed time by telling the time one hour before or one hour after?

Unit 5 Grade-Level Expectations (GLEs) and Common Core State Standards (CCSS)

<table>
<thead>
<tr>
<th>GLE #</th>
<th>GLE Text and Benchmarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Model the concepts of thirds, fourths, fifths and sixths using regions, sets, and fraction words (e.g. one-third, three-fourths, five-sixths) (N-1-3)</td>
</tr>
<tr>
<td>16.</td>
<td>Tell time to the nearest 5 minutes, and identify the time one hour before or after a given time (M-1-E) (M-3-E)</td>
</tr>
<tr>
<td>26.</td>
<td>Construct and read line plots and tables (D-2-E)</td>
</tr>
<tr>
<td>Math CCSS</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Numbers and Operations in Base Ten</strong></td>
<td></td>
</tr>
<tr>
<td>2.NBT.2</td>
<td>Count within 1000; skip count by 5s, 10s, and 100s.</td>
</tr>
<tr>
<td>2.NBT.7</td>
<td>Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.</td>
</tr>
<tr>
<td><strong>Measurement and Data</strong></td>
<td></td>
</tr>
<tr>
<td>2.MD.8</td>
<td>Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ELA CCSS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reading Standards for Informational Text</strong></td>
<td></td>
</tr>
<tr>
<td>RI.2.1</td>
<td>Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.</td>
</tr>
<tr>
<td>RI.2.4</td>
<td>Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area.</td>
</tr>
<tr>
<td>RI.2.5</td>
<td>Know and use various text features (e.g., captions, bold print, subheadings, glossaries, indexes, electronic menus, icons) to locate key facts or information in a text efficiently.</td>
</tr>
<tr>
<td><strong>Writing Standards</strong></td>
<td></td>
</tr>
<tr>
<td>W.2.2</td>
<td>Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.</td>
</tr>
<tr>
<td>W.2.8</td>
<td>Recall information from experiences or gather information from provided sources to answer a question.</td>
</tr>
<tr>
<td><strong>Speaking and Listening Standards</strong></td>
<td></td>
</tr>
<tr>
<td>SL.2.1</td>
<td>Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.</td>
</tr>
<tr>
<td>a.</td>
<td>Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).</td>
</tr>
<tr>
<td>b.</td>
<td>Build on others’ talk in conversations by linking their comments to the remarks of others.</td>
</tr>
<tr>
<td>c.</td>
<td>Ask for clarification and further explanation as needed about the topics and texts under discussion.</td>
</tr>
</tbody>
</table>
Sample Activities

Activity 1: Coin Concepts (CCSS: 2.MD.8, RI.2.1)

Materials List: examples of each type of coin (classroom coin manipulatives or real coins), Coins Word Grid BLM, large pictures of coins, pencil, index cards

As a prerequisite to this unit on money, use a modified word grid (view literacy strategy descriptions) to review the coin denominations with students. The word grid is modified to allow students to relate coin features to the names of the coins. Students will use the word grid to identify coin names; to notate their color, value, heads and tails pictures; and to identify how many of each of the coins are equal to one dollar. Give each student a Coins Word Grid BLM and one of each type of coin. Using real coins as much as possible will allow students to identify the newer coins that have a variety of representations on the heads and tails sides.

Display a large coin picture and ask the students to find that coin. If students are using real coins, discuss that some coins are newer and may have different pictures on the heads or tails side. Assist students who may have trouble identifying these coin variations. As each coin is presented, discuss these variations with the students and allow them to locate coins that may have a different representation than what is displayed on the large coin pictures. Read the story of each coin from the U.S. Mint website: http://www.usmint.gov/kids/coinNews/circulating/. This website provides the history of each coin, pictures of some of the variations, and some fun facts. Discuss the features of the coin, allowing the students to complete the word grid as they identify the features. Show the students how to make a coin rubbing on the word grid. After completing the grid, ask the students to locate information that tells how the coins are alike and different. Students may refer to their word grids as they work with coins throughout this unit.

Students can also use their word grids to quiz each other in preparation for tests and other class activities by asking “Which Coin?” questions. Provide each student with an index card. Instruct students to write a “Which Coin?” question on the card (ex. “Which coin shows Abraham Lincoln on the heads side? Which coin is worth 25 cents?”) Use these questions to play professor know-it-all (view literacy strategy descriptions) to review the information included in the word grid. Call a group of 4 students to the front of the room. They may bring their word grids with them for reference. Choose four students to read their questions and allow the group to confer about the answers. They may check their word grids before answering aloud. Each student should have a turn as the spokesperson for the group. If the group answers all four questions correctly, name them as professors know-it-all and allow each student to select a new student to take his/her place in the front of the room.

Activity 2: Counting Coins (CCSS: 2.NBT.2, 2.MD.8)

Materials List: classroom coin manipulatives, Hundreds Chart BLM

Students should enter 2nd grade with prior experience counting coins by single denominations. Review this skill by having students count sets of pennies, nickels, dimes, or quarters.
Give each student a Hundreds Chart BLM, 10 dimes, and 10 pennies. Tell students to take out 2 dimes and 3 pennies (23¢). Have a student demonstrate how he/she would find the total value of these coins. Question students why it would be appropriate to start the counting with the dimes.

Invite students to discuss how they might use a hundreds chart to help them find the value of coins. Inquire about where the coins should be placed on the hundreds chart. Using a hundreds chart and coins, model how to place the coins (2 dimes and 3 pennies) on the chart.

- Encourage students to start with the coin that has the greatest value.
- Start with one of the dimes. Ask students, “What is the value of a dime?” (10 cents). Count ten spaces on the hundreds chart, and place the dime on the 10.
- Using the second dime count ten more spaces from the 10 on the hundreds chart, and place the second dime on the 20. Ask students to identify the pattern that they see with dimes.
- Ask students, “What is the value of a penny?” (1 cent). Have students start with 20 and count one space to place their first penny on 21. Continue with the remaining pennies, placing them on 22 and 23.
- Have students count the coins by touching each coin and saying the number where it is placed on the hundreds chart.

Have students clear their charts. Give them a different combination of dimes and pennies. Students should make the connection between using dimes and skip counting by tens on the hundreds chart. They should just add on 1 for each penny that they have.

After students have practiced several combinations, give them an amount and have them find the total number of dimes and pennies it would take to model that amount. This activity should be practiced throughout the week. Vary the coins that students use each day. (Suggested order: dimes and pennies, nickels and pennies, dimes and nickels, then dimes, nickels and pennies, and then introduce quarters.) After counting mixed sets of just coins, have students count coins and dollars and have them write the amounts using the dollar sign ($) and using the cent sign (¢). Discuss different coin combinations that are equal to $1.00.

Activity 3: Which Coins Am I Holding? (GLEs: 26; CCSS: 2.MD.8)

Materials List: cups, classroom coin manipulatives, paper, pencil

Place a set of mixed coins in a cup. Present the students with the following problem:

“I have 4 coins that total 17¢. Which coins do I have?”

Write the number of coins and their value on the board. To gather clues about which coins are in the cup, have students ask up to 10 questions that can be answered with a yes or no response. Draw a coin table on the board to record the students’ questions and the answers. Have the students first ask questions to determine the types of coins included, and then the number of each coin.
Example:

Tell students, “I have 4 coins that have a total value of 17¢.”
Students might ask,
• “Do you have a dime?” (yes)
• “Do you have a penny?” (yes)
• “Do you have a nickel?” (yes)
• “Do you have a quarter?” (no) This question should be discussed at the end of the activity. Explain to students that because a quarter has a value greater than 17¢, this question was not helpful in determining the number and types of coins in the cup.

After students have determined which coins are included, have them find the number of each coin. Students might ask,
• “Do you have 2 pennies?” (yes)
• “Do you have 2 nickels?” (no)
• “Do you have 1 nickel?” (yes)

Have students continue to ask questions until they have determined the coins in the cup.
After determining the coins, check for accuracy by writing the values and adding the amounts for each coin type. (10¢ + 5¢ + 2¢ = 17¢)

Give students an opportunity to conduct this activity with partners. Provide each pair of students with a cup, some coins, and a blank piece of paper. Partner A will secretly count an amount of coins and place them in the cup. Partner B will draw the table on the blank piece of paper. Partner B will ask questions as Partner A answers and records their responses on the table. When the correct number of coins has been determined, the partners will switch roles.

*Teacher Note:* This is a great activity to keep handy. It can be used as a bellringer or as a filler when you have an extra 5 minutes during the day.

**Activity 4: Ways to Show an Amount (CCSS: 2.MD.8, W.2.8, SL.2.1a-c)**

Materials List: Money Table BLM, bags of classroom coins per group, math learning logs

Review with the students that one way to make 20¢ is to use 20 pennies. Present the following scenario to the students:

I want to but some gum for 20¢, but I don’t have 20 pennies. What coins could I give to the clerk to purchase the gum for 20¢?

Put students into groups of 3. Give each group a bag of coins and the Money Table BLM. Invite the students to find 3 other ways to make 20 cents using the coins from the bag. Allow the students time to discuss their ideas and ways they could show twenty cents using a combination
of coins. Each partner will take turns making the amount of money and recording a tally mark on the money table for each coin used. The three partners should each use different coins to show the same amount.

Sample Response:

<table>
<thead>
<tr>
<th>Ways to Show 20¢</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quarters</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

Repeat the activity 3 more times, allowing each partner to select an amount to show. He/she should write the amount in the top row of the table. Encourage students to use a variety of mixed coins when showing their amounts rather than counting out all pennies.

In their math learning logs (view literacy strategy descriptions), have the students respond to the following question: “Why do you think it is important to know different ways to show one amount of money?” Allow students time to write their responses.

After students have completed their responses in their math learning logs, use the “Think Pair Square Share” form of discussion (view literacy strategy descriptions) to allow students an opportunity to share and discuss their ideas with partners and then in groups of four. Pair the students with a partner to discuss and compare their ideas. This pair of students will form a square of four students by joining another pair of students to extend the discussion. Finally, groups share their responses and explanations with the class. Students may add more information to the answers in their learning logs after discussing their ideas with their partners and hearing responses and explanations from their classmates.

Activity 5: Adding and Subtracting Money Amounts (CCSS: 2.NBT.2, 2.NBT.7, 2.MD.8; SL.2.1 a-c)

Materials List: classroom coin manipulatives, student dry erase boards, markers, and sock erasers, Coin Cards BLM (2 sets if needed), Add and Subtract Money BLM

Model how to add and subtract amounts of money. Ask two students to come to the front of the room and take a different amount of coins (up to one dollar). Have the two students count their coins and record the amount on the board using the ¢ symbol (ex. 74¢ and 48¢). Lead a discussion on ways to find the sum and difference of the two amounts of money. Write the two amounts as addition and subtraction statements.

74¢ + 48¢   74¢ – 48¢
The strategies below are some of the strategies students can use to solve the problems. Strategies should be modeled and sufficient practice should be provided for students to become comfortable and proficient with them.

**Using classroom coins:**
Model the two addends with coins, combine the sets of coins, and count the coins altogether to find the total of 122¢, or $1 and 22¢.

Show the larger amount in coins and remove the smaller amount to find the difference.

There are not enough pennies to take away 8¢, so a trade needs to be made. Trade 1 quarter for 2 dimes and a nickel. Then remove 4 dimes (40¢) and 1 nickel and 3 pennies (8¢). This leaves 1 quarter and 1 penny or 26¢.

**Expanded form:**
Write the amounts in expanded to add or subtract tens and ones.

\[
egin{align*}
74¢ &= 70 \text{ cents} + 4 \text{ cents} \\
+ 48¢ &= 40 \text{ cents} + 8 \text{ cents} \\
110 \text{ cents} + 12 \text{ cents} &= 122 \text{ cents or } 1 \text{ dollar and } 22 \text{ cents}
\end{align*}
\]

\[
egin{align*}
60 \quad 14 \\
74¢ &= 70 \text{ cents} + 4 \text{ cents} \\
- 48¢ &= 40 \text{ cents} + 8 \text{ cents} \\
20 \text{ cents} + 6 \text{ cents} &= 26 \text{ cents}
\end{align*}
\]

**Writing amounts as dimes and pennies:**
Write the amounts as dimes and pennies and then add.

\[
egin{align*}
74¢ &= 7 \text{ dimes and } 4 \text{ pennies} \\
+ 48¢ &= + 4 \text{ dimes and } 8 \text{ pennies} \\
11 \text{ dimes and } 12 \text{ pennies} &= 12 \text{ is equal to } 1 \text{ dime and } 2 \text{ pennies, so that would make } 12 \text{ dimes and } 2 \text{ pennies. Since } 10 \text{ dimes is equal to } 1 \text{ dollar, the ten dimes can be exchanged for } 1 \text{ dollar. There would be } 1 \text{ dollar, } 2 \text{ dimes, and } 2 \text{ pennies. That is } 122¢, \text{ or } $1 \text{ and } 22¢.
\end{align*}
\]

Write the amounts as dimes and pennies and then subtract.

\[
egin{align*}
6 \quad 14 \\
74¢ &= \_dimes \_pennies \\
- 48¢ &= - 4 \text{ dimes and } 8 \text{ pennies} \\
2 \text{ dimes and } 6 \text{ pennies} &= I \text{ do not have enough pennies to subtract } 8, \text{ so I need to exchange } 1 \text{ dime for } 10 \text{ more pennies. That will give me } 14 \text{ pennies and } 6 \text{ dimes. } 14 \text{ pennies} - 8 \text{ pennies} = 6 \text{ pennies. } 6 \text{ dimes} - 4 \text{ dimes} = 2 \text{ dimes. } 2 \text{ dimes and } 6 \text{ pennies equals } 26¢.
\end{align*}
\]
Drawings:
Draw a picture of the coins in dimes and pennies and count them together to add:

![Image of coins: 10 dimes and 10 pennies = $1, 10 dimes and 10 pennies = $1.20, 10 dimes and 10 pennies = $1.20]

Total = 122¢, or $1 and 22¢

Draw a picture of the coins in dimes and pennies and cross off to subtract:

![Image of crossed out coins: 5 dimes and 5 pennies - 3 dimes and 3 pennies = 2 dimes and 2 pennies]

Difference = 26¢

Repeat this procedure several times to allow students practice with adding and subtracting amounts of money.

Cut apart the Coin Cards BLM into individual cards. Distribute the cards to the students and have them count the amount of money shown on the cards. Provide each student with an Add and Subtract Money BLM. The students will participate in a Mix-Freeze-Pair-Solve activity:

1. Call out “Mix” - The students will walk slowly around the room with their coin card, the Add and Subtract Money BLM, and a pencil.
2. Call out “Freeze” - The students will stop walking and locate a partner by making eye contact with the closest person.
3. Call out “Pair” - The students will take a step toward the partner and sit on the floor next to their partner. Assist students who have not located a partner.
4. Call out “Solve” - Each partner will tell how much money is on his/her card. Both partners will record the amounts on the recording sheet, setting up an addition statement and a subtraction statement for the two amounts. The amounts should be recorded in cents only. The partners will work together to solve the problems using one of the strategies presented. When both partners have solved the two problems, they should compare and check their answers together for accuracy. Circulate around the room to provide assistance as needed.
5. When all students have finished, the partners will trade cards and begin the process again, starting with “Mix.” Complete at least four rounds to allow students additional practice with adding and subtracting amounts of money.

After students have completed 4 rounds, allow students to share some of the addition and subtraction statements and demonstrate how they found the solution.
Activity 6: Shopping Spree (GLE: 1; CCSS: 2.MD.8, W.2.2, SL.2.1a, b, c)

Materials List: classroom money, Shopping Spree BLM, Shopping Spree Answer Sheet BLM, math learning logs

Display the following problem.

I have $1, or 100¢, in my piggy bank. I want to buy a notebook for 54¢ and a pencil for 49¢. Do I have enough money for both items? How much change will I get back or how much more money do I need?

Allow students to share ways they could represent the prices of the two items using coins, numerals, words, or drawings.

Examples of ways to represent the amounts:

Write in dimes and pennies:
5 dimes and 4 pennies
4 dimes and 9 pennies

Draw the coins:

Numerals:
54¢
49¢

Using classroom coins:

Review how to use these representations to find the total amount of money needed to purchase the notebook and pencil. Students should determine that the two items will cost 103¢, or $1 and 3¢. Ask students to answer the question for the problem (No, I do not have enough money. I would need 3 cents more.)

Provide additional examples with the following word problems. Display the word problems with a blank for the money amounts. Select students to choose coins from a bag and use the amounts to complete the word problem statements. Discuss how to solve the problems with addition and subtraction. Have the students use dry erase boards and dry erase markers to solve the problems.

John has ____¢ in his bank. Mark has ___¢ cents in his bank.
How much money do they have together?
How much more money does John have than Mark?

Stacy has $2, or 200¢, to buy three toys. The ball is ___¢. The puzzle is ____¢. The jump rope is ___¢.
How much will the three toys cost in all?
How much change will Stacy get back?
If the amounts chosen total more than $2, ask students to tell how much more money Stacy needs.

Provide pairs of students with the Shopping Spree BLM. Tell the students they will have $3 or $300¢ to “spend” with their partners. Have partners choose up to 4 items to “purchase.” Have them find the total for the items they selected and decide if they have enough money to buy all four items. If they do not have enough money, they should select new items until they find 4 that total less than $3. If they have extra money, they should select another item to get as close to $3 as they can without going over. Have the students represent their work on the Shopping Spree Answer Sheet BLM. The students should illustrate the items (or cut them out and glue them to the answer sheet) and write an explanation of their work and the strategy they used to calculate the total for the items they chose. Display their answer sheets to highlight various ways to add money.

Have the students answer the following questions in their math learning logs (view literacy strategy descriptions): Which 3 items would you purchase if you only had $2, or 200¢? How many trucks could you buy if you only had $1, or 100¢? Allow students to share their responses with their partners and compare their choices.

Activity 7: Pocket Full of Money (CCSS: 2.MD.8)

Materials List: Money Word Problems BLM, Pocket Full of Money BLM (2 pages), Pocket Full of Money Answer Sheet BLM, 16 bags with classroom coins and one-dollar bills, mixed collection of classroom coins (not separated into bags), Writing Money Problems BLM, zip-top bag, dry erase marker

Before class begins, make 16 bags of money containing one-dollar bills and/or coins less than a dollar. Cut out the pockets from the Pocket Full of Money BLM and tape one to each bag to label it with the number of one-dollar bills and coins it contains. Cut out the cards from the Money Word Problems BLM and place them in the corresponding bags.

Example:

Place the following classroom money in the bag:

Gabby’s Pocket
5 dimes
2 nickels
1 penny

Tell the students the following story: These students went on a field trip to the zoo. Each of them has a pocket full of money to spend at the gift shop and concession stand. Read their stories to find out what happened to their money.
Put students into pairs. Give each pair a Pocket Full of Money Answer Sheet BLM and a bag of money. Have students determine the amount of money in the bag and record the value next to the name of the student on the answer sheet. After recording their amounts, have partners read the word problem card. The partners will work together to solve the problem and record their answer on the answer sheet. The students may use classroom money, pictures, words or numerals to solve the problem. After completing the problem, the partners will pass the bag to the next pair of students. After all bags have circulated throughout the class, have students report their findings. Allow students time to compare and discuss different ways they solved the money problems.

Distribute the Writing Money Problems BLM to each student. Have each student take a handful of coins from the mixed coins collection. Have the students count the coins chosen and list them on the pocket illustration on the Writing Money Problems BLM. The students should find the total amount of money chosen but should not write it on the line next to the question. This line should be left blank for other students to fill in the answer. Have the students use the chosen amount of money to write an addition or subtraction word problem on the lines. Word problems should be similar to the problems from the Money Word Problems BLM. The space at the bottom of the page should be left blank as a work space for other students to use when solving the problem. Laminate these problems and store them in a large zip-top bag with a dry erase marker. When extra time is available, students may select a page from the bag to practice solving money problems.

**Activity 8: Telling Time (GLE: 16; CCSS: 2.NBT.2, W.2.8)**

Materials List: math learning logs, demonstration clock, Clock Face BLM (copy on card stock), brad fasteners, student clock manipulatives (optional)

Write the following list of words on the board: clock, hand, face, time, minute, hour. Have students use these words to write a lesson impression (view literacy strategy descriptions) in their math learning logs (view literacy strategy descriptions). Students should tell what they know about how the words are related and what they think today’s lesson will be about.

Example:
We are learning about time today. You can use a clock to tell time. The clock has a face with numbers and lines. The arrows on a clock are the hands. They tell the minutes and hours.

Ask volunteers to share their lesson impressions with the class. As students share, take note of their prior knowledge about clocks and telling time. Use this information to guide the following discussions and to clear up any misconceptions that may be revealed through the lesson impressions.

Review the parts of a clock (i.e., face, hour hand, minute hand). Preset a demonstration analog clock (or an analog clock without a battery) for 1:00. Show students how the hour hand moves between the hours as the minute hand approaches 30 minutes. Ask students to observe the clock...
as the minute hand is slowly moved. (The hour hand is slowly moving as well.) As you approach 30 minutes, ask a volunteer to describe where the hour hand is located. (At 30 minutes, the hour hand is half-way between the 1 and the 2.) Continue winding the clock, stopping at 1:50. Ask students to turn and talk to a partner about what they notice about the hour hand now. (The hour hand is closer to the two.) Continue to 2:00 and have students identify the time shown.

Give students a Clock Face BLM. Have the students label the hour hand (found at the top of the BLM), color it red, label the minute hand and color it blue. Ask students to describe what they see on the clock face. (the numerals 1 – 12 and some lines, hash marks, or tic marks. Some marks are longer than others.) Discuss with students that each hash mark on the outer edge of the clock represents one minute. Have students count out the minutes in an hour going around the clock face. Tell the students that they should closely observe what number they count as they get to a numeral on the clock face. Ask students if they noticed anything special when they got to a numeral on the clock face (i.e., these are the numbers they say when they skip count by 5s). Have students skip count by 5s for each numeral and write the number of minutes next to each numeral on the Clock Face BLM.

Use the demonstration clock to model telling time to the nearest 5 minutes. Be sure to model times where the hour hand is close to the next hour (1:45, 3:50, 9:55, etc.). Assist students in understanding that when reading the hour, they should check to see which numeral the hour hand has just passed, not the numeral that it is closest to. Students have a hard time with this as the hour hand more closely approaches the next hour, so provide additional practice as needed. Make the connection between a digital clock and an analog clock. Show students how a digital clock is set by first setting the hour and then holding down the minute button to watch the minutes change from 00-59 minutes. Ask students to tell what happens after the clock has reached 59 minutes. (The hour changes and the minutes change back to 00).

Have students cut out the hands from the Clock Face BLM. Use a brad fastener to attach the hands to the clock face. Students may glue the clock faces to a paper plate for durability. Call out different times using five minute intervals (e.g., 2:20, 3:45), and have students set their clocks. Set times to the 5 minutes on the digital clock, and have students model them on their analog clock. If student clock manipulatives are available, allow students to use these to set the times. Geared clock manipulatives will allow students to more closely see how the minute hand and hour hand move in relation to each other.

At the conclusion of the lesson, have students draw a line below their lesson impressions to divide the page in half and use the same words to write a summary about what they learned. Students should include a statement that evaluates how closely their lesson impressions compare to the actual lesson content.

Teacher Note: Store student-made clocks for use in future activities.
Activity 9: Quarters of an Hour (GLEs: 2, 16; CCSS: RI.2.4)

Materials List: student-made clocks (from Activity 8), crayons, 4 quarters, What Time Is It? Cards BLM

Display the following rhyme and discuss the meaning of the terms half-past two and half-past eight with the students:

Cobbler, cobbler, mend my shoe.
Get it done by half-past two.
Half-past two is much too late.
Get it done by half-past eight.

Tell the students that many people use words like before, ‘til/until, past, and after to tell the time. When telling times between five minutes and 30 minutes people often use the terms past or after (i.e. 3:05 is 5 minutes past 3, 5:20 is 20 minutes after 5). To tell the times before or until the hour, people count the minutes back from the next hour, so times between 30 minutes and the next hour are often told using the terms before or ‘til/until (i.e. 3:40 is 20 minutes until 4, and 6:50 is 10 minutes before 7). Model how to determine these times using a demonstration clock. Have students show the following times using their student-made clocks: 10 minutes after 8, 25 minutes until 3, 20 minutes past 10, and 15 minutes before 1.

Have students divide the face of their student-made clocks into quarters by drawing a line from the 12 to the 6 and from the 9 to the 3. Have students color each part using a different color. Ask students how many different parts they have divided their clocks into (4). Lead students to understand that the correct wording to use is “the clock is divided into fourths” instead of into 4. Have students mimic you as you travel along the edge of the clock saying 1 fourth, 2 fourths, 3 fourths, and 4 fourths. Then take out 4 quarters and ask them how quarters are like the parts that they colored on the clock. (It takes four quarters to make a dollar, and it takes 4 fourths of an hour to make an hour.) Tell students that people often say one-quarter of the hour has passed instead of saying one-fourth of an hour has passed.

Using the student-made clocks, have students explore the number of minutes in a quarter-hour and a half-hour. The students should recognize that each quarter contains 3 numerals and that they can count the numerals by fives to see that there are 15 minutes in a quarter hour. They should also recognize that two quarters equal a half-hour containing 30 minutes. Discuss with students that when telling times on the quarter hours, people often use the phrases quarter after, half past, and quarter ‘til. Have the students show the following times on their student-made clocks: half-past 5, quarter ‘til 2, quarter past 9.

Divide the class into groups of four. Copy the What Time Is It? Cards BLM and cut them apart for each group. Distribute a set of cards to each group. Have the students play “1, 2, 3, Show Me.” One student will choose a card and read it to the group. Each student in the group will set his/her clock to the time requested on the card. After all students in the group are ready, the card-reader will call “1, 2, 3, Show Me.” The students in the group will turn their clocks around to compare and check. They should assist students in their group who do not have the correct time displayed.
Activity 10: School Routine (GLEs: 16, 26; CCSS: RI.2.5, W.2.8)

Materials List: student-made clocks (from Activity 8), timer, large copy of class schedule, Daily Activities Log BLM, A Day in My Life BLM, pencil, crayons

Display a large schedule that shows what time daily class activities begin. Use the schedule to ask questions about the events of the day. (What time is lunch? If math lasts one hour, what time will it end?) Students will use clock manipulatives or the paper clocks created in Activity 8 to show the answers for the questions.

Give each student a Daily Activities Log BLM. Have students list their regular daily activities and record the time for the activity using times to the nearest 5 minutes. Complete the log together with times through end of the school day (such as school begins, reading time, lunch, math time). Have students add in their own evening activities (such as do homework, eat dinner, take a bath, go to dance practice, go to bed, etc.) Students may complete this independently in class or take it home to fill in with a parent. Have them answer questions according to their findings.

Make two 2-sided copies of the A Day in My Life BLM per student. Distribute the pages and have the students fold them together and staple to create a mini-book. A 9 × 12 piece of construction paper may be added to make a cover. Have the students select 8 activities from their daily activities log to create a book. They will illustrate the activity in the box, write a sentence to tell what time they do the activity, and illustrate the time on the analog and digital clocks. After creating the books, divide the class into groups of four and allow the students to share their books with the group. The students in the group will use clock manipulatives or their student-made clocks to show the times for each activity as the books are shared. After sharing, have students compare and contrast their daily events and the times for these events with their groups. Place the books on display for students to read when extra time is available.

Activity 11: Activity Time (GLE: 16; CCSS: 2.NBT.2)

Materials List: student-made clocks (from Activity 8), Hour Before and After BLM

Display the following problem for students:

John got home from school at 3:45. He ate a snack and watched TV for an hour and then started his homework. What time did he start his homework?

Have students use their student-made clocks to display 3:45. Ask students to discuss the problem with a partner and to use their clocks to explore the answer. Have partners share with the class how they found the time. Students should determine that the minute hand would move around the clock for 60 minutes and the hour hand would move to the next number. Have students act this out using their clocks and counting by fives as they move the minute hand to each numeral on the clock. Repeat the activity with the following problems, allowing students to discuss their ideas with a partner and then share with the class.
Jennie’s mom picked her up from basketball practice at 7:00. Her practice was one hour long. What time did Jennie’s practice begin? (6:00)

Gayle went skating with her friend at 12:30. Her mom picked her up at 1:30. How long did she skate with her friend? (1 hour)

My birthday party is at 3:15. My friend got there one hour early. At what time did my friend arrive? (2:15)

Lydia’s game started at 8:00. Her coach told her to get there at 7:00. How many hours early did Lydia have to be at the game? (1 hour)

Provide pairs of students with an Hour Before and After BLM. Have the partners take turns solving the problems and checking. Partner A will read and solve the first problem and then pass the paper to Partner B to check. If the problem is solved correctly Partner B may draw a smiley face and then work the next problem. If it is not solved correctly, Partner B should return the paper to Partner A and provide assistance in solving the problem correctly.

Provide more problems for additional practice as necessary. Be sure to provide a variety of examples including problems that give the start time, the elapsed time and an unknown end time; problems that give the end time, the elapsed time, and an unknown start time; and problems that give the start and end time with an unknown amount of elapsed time.

**Activity 12: Who Has Time? (GLE: 16)**

Materials List: Who Has Time? BLM (3 pages)

Prior to class, print the Who Has Time? BLM (3 pages) cards on cardstock, laminate them and then cut them out.

Play a round of *I have...Who has?* Distribute one clue card to each student. Make sure to hand out all of the cards. Some students may receive more than one card. The student with the card that has a star in the corner should stand up and read his/her card first. The student that has the card with the clock showing the time that answers the first student’s question will stand and read his/her card. Play will continue until the last card is read.

First student reads:

I have twelve-thirty. Who has half past nine?

I have nine-thirty. Who has five minutes after eight?

I have eight-o’five. Who has one hour after six?

I have seven o’clock. Who has a quarter ‘til five?

I have four-forty-five. Who has a quarter past eleven?

Last clue leads back to first card.
Activity 13: Time Know-It-Alls (GLE: 16; CCSS: RI.2.1; SL.2.1a,b,c)

Materials: index cards, pencils, student-made clocks (from Activity 8)

Announce “It’s time for professor know-it-all!” The students will play professor know-it-all (view literacy strategy descriptions) to review concepts about time.

Divide the class into groups of four. Provide each group with 4 index cards. The groups will write one question about telling time on each of the index cards. They may use their student-made clocks to set up questions about telling time.

Sample questions might include:
- How do you show 4:50 on a clock?
- What time is on this clock? (The student will display a time using his/her student-made clock.)
- If I go swimming at 7:15 and stay for one hour, what time will I leave?
- What is one hour before the time on this clock?
- How do you show half past 8 on a clock?

Select a group to be the Professors. They will stand in the front of the room, shoulder to shoulder. They will call on the other groups to read one of their questions about the time. The professors will huddle to discuss how to answer the question. They may use their student-made clocks if needed. One student from the group will be selected to state the answer to the question. The class should consider the answer given and ask for elaboration or correction if needed. After each student in the group has had an opportunity to be the spokesperson, the class may congratulate them on their success at knowing all about telling time. Choose a new group to come up as professors and continue the questioning process.

To add novelty to the activity, provide props or costumes (detective hats, lab coats, crowns, etc.) and award certificates for the Know-It-Alls!

Sample Assessments

General Assessments

- Math learning log prompt: If I found a dollar, I could buy __________ that costs __________. Explain if you would or would not get change back.
- Counting Money: Use a checklist to note students that are having difficulty counting money.
- Using a large demonstration clock, set time to 5 minute intervals and assess whether the student can identify the correct time displayed.
Activity-Specific Assessments

- **Activity 1:** Give the student a double Venn diagram and have him/her compare and contrast a penny and a nickel by filling in characteristics of the coins.

![Venn diagram of penny and nickel with characteristics]

- **Activity 2:** Set up bags with coins and $1 bills and number the bags. Give each student a recording sheet that corresponds to the numbers on the bags. Have the student choose a bag, count how much money is in the bag, and record the amount next to the bag’s number on his/her recording sheet.

- **Activity 4:** Provide a money table labeled quarter(s), dime(s), nickel(s) and pennies. Have the student then represent 37 cents in three different ways using a variety of coin combinations.

- **Activity 7:** Have the student solve the money word problem created by classmates using classroom coins, pictures, words, or numerals.

- **Activities 8, 9 and 11:** Provide the student with a clock. Have the student:
  - Identify the parts of a clock (minute hand, hour hand, face).
  - Set the clock to the hour.
  - Set the clock to the nearest half-hour adjusting the hour hand.
  - Count by 5s around the clock.
  - Model 6:45.
  - Model a written time, such as 2:20.
  - Model a quarter past 5.
  - Represent 9:10 and tell what time it would be an hour later.

- **Activity 9:** Have the student make up 3 time riddles for others to solve. The riddles can be made into a class book. (For example: My hour hand points to 5. My minute hand points to 3. What time do I go to dance lessons?) As each student shares his/her riddles, each student will show the time on his/her individual clock face and will count by 5s from twelve to find the correct answer. Observe all students for mastery of this skill as they create and solve the riddles.

- **Activities 11:** Give the student problems where he/she must determine the hour before or after a time that an activity begins or ends.
Unit Description

This unit focuses on geometric and fractional number understandings. In geometry, students describe and analyze 2-dimensional and 3-dimensional shapes by examining their attributes such as sides, faces, edges, and angles. Students also examine fractions in region and set contexts.

Student Understandings

Students identify, analyze, draw, compare, and contrast 2-dimensional and 3-dimensional shapes and their attributes. Students use fractions to model concepts of halves, thirds, fourths, fifths and sixths.

Guiding Questions

1. Can students compare and contrast 2-dimensional and 3-dimensional shapes according to specific attributes?
2. Can students identify triangles, quadrilaterals, pentagons, hexagons, cubes, rectangular prisms, spheres, cones, cylinders, and pyramids?
3. Can students identify halves, thirds, fourths, fifths, and sixths?
4. Can students model fractional representations using regions, sets, and fraction words and symbols?

Unit 6 Grade-Level Expectations (GLEs) and Common Core State Standards (CCSS)

<table>
<thead>
<tr>
<th>Grade-Level Expectations</th>
<th>Grade-Level Expectations</th>
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</thead>
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<tr>
<td><strong>GLE #</strong></td>
<td><strong>GLE Text and Benchmarks</strong></td>
</tr>
<tr>
<td><strong>Number and Number Relations</strong></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Model the concepts of thirds, fourths, fifths and sixths using regions, sets, and fraction words (e.g. one-third, three-fourths, five-sixths) (N-1-3)</td>
</tr>
<tr>
<td><strong>Geometry</strong></td>
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<tr>
<td>21.</td>
<td>Compare and contrast 3-dimensional shapes (i.e., sphere, cube, cylinder, cone, prism, pyramid) according to their attributes (e.g., number of faces, shape of faces) (G-2-E)</td>
</tr>
<tr>
<td><strong>Math CCSS</strong></td>
<td></td>
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<tr>
<td><strong>CCSS #</strong></td>
<td><strong>CCSS Text</strong></td>
</tr>
<tr>
<td><strong>Geometry</strong></td>
<td></td>
</tr>
<tr>
<td>2.G.1</td>
<td>Recognize and draw shapes having specified attributes, such as a given number of angles, or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.</td>
</tr>
</tbody>
</table>
### ELA CCSS

<table>
<thead>
<tr>
<th>CCSS #</th>
<th>CCSS Text</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reading Standards for Informational Text</strong></td>
<td></td>
</tr>
<tr>
<td>RI.2.1</td>
<td>Ask and answer such questions as <em>who</em>, <em>what</em>, <em>where</em>, <em>when</em>, <em>why</em>, and <em>how</em> to demonstrate understanding of key details in a text.</td>
</tr>
<tr>
<td>RI.2.4</td>
<td>Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area.</td>
</tr>
<tr>
<td><strong>Writing Standards</strong></td>
<td></td>
</tr>
<tr>
<td>W.2.2</td>
<td>Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.</td>
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<tr>
<td>W.2.7</td>
<td>Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).</td>
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<tr>
<td>W.2.8</td>
<td>Recall information from experiences or gather information from provided sources to answer a question.</td>
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<tr>
<td><strong>Speaking and Listening Standards</strong></td>
<td></td>
</tr>
<tr>
<td>SL.2.1</td>
<td>Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.</td>
</tr>
<tr>
<td></td>
<td>a. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).</td>
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<td></td>
<td>b. Build on others’ talk in conversations by linking their comments to the remarks of others.</td>
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<tr>
<td></td>
<td>c. Ask for clarification and further explanation as needed about the topics and texts under discussion.</td>
</tr>
<tr>
<td>SL.2.4</td>
<td>Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent sentences.</td>
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</tbody>
</table>

### Sample Activities

**Activity 1: Shapes Attributes (GLE: 21; CCSS: 2.G.1, RI.2.1, RI.2.4)**

Materials List: Shapes BLM (7 pages), 3-dimensional shapes (sphere, cube, cone, cylinder, rectangular prism, pyramid), 2-D Shapes Attributes BLM, 3-D Shapes Attributes BLM, glue, math learning logs, pencils

Copy and cut out the Shapes BLM. Lead a discussion about each shape. Display the circle and ask students to identify the shape. Discuss that the circle has no straight sides. Show the students the square, rectangle, and trapezoid. Have students name these shapes. Ask a student to count the number of straight sides on each shape. (4) Explain that an *angle* is formed when two straight sides meet. Ask how many angles each shape has. (4) Discuss that these shapes are types of quadrilaterals. Explain that a quadrilateral is a shape with 4 straight sides. Discuss the triangle, pentagon, and hexagon. Have students count the number of sides and angles for these shapes.
Give students the 2-D Shapes Attributes BLM. Have students complete the description of the square on the 2-Dimensional Shapes Attributes modified word grid (view literacy strategy descriptions). This is a modified word grid in that instead of putting checks, pluses, or minuses in each cell, students will write the names of the shapes and identify the attributes for each shape.

Example of a 2-Dimensional Shapes Attributes word grid:

<table>
<thead>
<tr>
<th>Picture of Figure</th>
<th>Name of Figure</th>
<th>Number of Sides</th>
<th>Number of Angles</th>
<th>Special Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="circle.png" alt="Circle" /></td>
<td>circle</td>
<td>0</td>
<td>0</td>
<td>round, no straight sides</td>
</tr>
</tbody>
</table>

Put students into pairs to complete the remaining shapes on the charts. Provide each pair of students with one shape. Have the partners discuss the attributes of the shape. Have them fill in the information for the attributes of the shape and then trade shapes with another pair of students. Continue the activity until all students have completed the word grids for all of the shapes. Once the word grids are complete, review the answers to ensure each student has complete and accurate descriptions of the shape attributes.

Hold up a cube and ask students to name the shape. Ask the students to describe how a cube is different from a square. Discuss that the flat shapes are 2-dimensional and the solid shapes are 3-dimensional. Explain that each flat surface of a cube is called a face. Ask someone to name the shape of a face of a cube (square). Count the faces and ask if all of the faces have the same shape. Point to an edge and explain that an edge is the line that is formed when two flat surfaces meet. Count the edges with the students. Point to a corner of the cube and explain that the corner is called a vertex and that the word vertices is used when talking about more than one vertex. A vertex is formed where 3 or more flat surfaces meet together. Have a student point to and count the number of vertices.

Give the students a copy of the 3-D Shapes Attributes BLM. Guide students through the completion of the 3-Dimensional Shapes modified word grid for the cube.

Example of a 3-Dimensional Shapes Attributes word grids:

<table>
<thead>
<tr>
<th>Picture of Figure</th>
<th>Name of Figure</th>
<th>Number of Faces</th>
<th>Number of Edges</th>
<th>Number of Vertices</th>
<th>Shape of Faces</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="cube.png" alt="Cube" /></td>
<td>cube</td>
<td>6</td>
<td>12</td>
<td>8</td>
<td>squares</td>
</tr>
</tbody>
</table>

Put students into pairs to complete the remaining shapes on the charts. Provide each pair of students with one shape. Have the partners discuss the attributes of the shape. On the BLM, have them fill in the name of the shape and the information for the attributes of the shape and then trade shapes with another pair of students. Continue the activity until all students have completed
the word grids for all of the shapes. Once the word grids are complete, review the answers to ensure each student has complete and accurate descriptions of the shape attributes.

After completing the word grids, have students quiz their partners about the attributes of the shapes by asking questions such as:
- Which shapes are 2-dimensional?
- Which shapes have 6 faces?
- Which shapes do not have any angles or vertices?
- How are the _____ (shape name) and _____ (shape name) alike/different?

Have students glue the word grids in their math learning logs (view literacy strategy descriptions) so that they may review it for future lessons or assessments.

Create vocabulary cards (view literacy strategy descriptions) for the following words: square, circle, triangle, rectangle, cube, sphere, cone, cylinder, rectangular prism, pyramid, 3-dimensional shape, 2-dimensional shape, vertex, face, and edge. Add these cards to the vocabulary cards collection created in Unit 1. Write the unit number or color a dot on the back to indicate the concept to which these cards relate. Be sure to allow time for students to review their cards individually and with a partner in preparation for other class activities and quizzes.

**Activity 2: What Shape Is It? (CCSS: 2.G.1, W.2.2)**

Materials List: Shape Variations BLM (2 pages), zip-top bags, Shape Variations Workmat BLM, construction paper, crayons, glue, scissors, index cards, pencils, learning logs

Prior to the activity, copy enough of the Shape Variations BLM for groups of 3 students. Cut out the shapes and place them in a zip-top bag.

Have students refer to the 2-D Shapes Attributes BLM (completed in Activity 1 and glued in math learning logs) to review the number of sides and angles of the 2-dimensional shapes.

Without naming the shape, show students various representations of a triangle.

Examples of triangles to display:

![Triangle examples](image)

Ask students to discuss with partners how the shapes are alike and how they are different. Listen as students discuss their ideas. Students may say that they are the same shape because they all have three sides and three angles, or they may say that the shapes are different because of the lengths of the sides and the sizes of the angles. Have the students refer to the Shapes Attributes BLM in their math learning logs to identify the name of the shape (triangle).

Divide the class into groups of three. Distribute the bags of shape variations to each group and a Shape Variations Workmat BLM. Instruct the groups to work together to sort the shapes into the following categories: triangles, quadrilaterals, pentagons, hexagons. Students may refer to their
2-D Shapes Attributes BLM to determine the type of shape by locating the number of sides and angles and then finding the shape name. As students identify the shape, have them place it in the correct category on the Shape Variations Workmat BLM. Allow groups to continue working until all shapes have been identified.

After groups have finished, direct the groups to trade places with another group and to check each other’s work. If a group finds a shape sorted into the wrong category, the group should discuss with the original team why they placed the shape in that category and then determine together into which category it fits. After all of the shapes are sorted correctly, lead a class discussion about what the students noticed about each category of shapes. Have students tell what they know about the lengths of the sides and the sizes of the angles. Have students discuss that the number of sides and angles determines the type of shape. The lengths of sides or sizes of angles can vary and the shape can be turned in any direction, but it is still the same shape. Ask students to tell what they noticed about the shapes in the quadrilateral group. (All of the shapes have 4 sides, but they look different. Some have square corners, some have big angles, some have long sides, etc.) Ask students to look at this group again and sort by types of quadrilaterals (square, rectangle, trapezoid, other). Remind students that a square is a special rectangle.

Provide each student with a copy of the Shape Variations BLM and a piece of construction paper. Have students cut out shapes and glue them to the construction paper to create a picture using the shapes. After the pictures are complete, have each student write an informative paragraph about his/her picture on an index card. The students should write an introductory statement about the picture, use facts and definitions to identify the shapes used in the picture, explain how the shapes were used to create parts of the picture, and provide a closing statement. Display the pictures and writings on a bulletin board or art wall.

Example of picture and informative paragraph:

I used my shapes to create a beach picture. The palm tree is made of many different shapes. The leaves are a quadrilateral, pentagon, and triangle. The trunk is made out of two quadrilaterals. One of the quadrilaterals used on the trunk is a trapezoid shape. The surfer has a hexagon surf board. It has six sides and six angles. The kite has four sides so it is a quadrilateral shape. The beach is full of many shapes. How many shapes can you find on a beach?
Activity 3: Draw My Shape (CCSS: 2.G.1)

Materials: dry erase boards, dry erase markers, sock erasers, index cards, pencils

Have students review the attributes of the 2-dimensional shapes using their completed 2-D Shapes Attribute BLM from Activity 1. Students should note the number of sides and number of angles for each of the shapes.

Read the following descriptions to the class and have students identify the shape described:

- My shape has 2 long sides. My shape has 2 short sides. My shape has 4 angles. Which shape(s) could my shape be? (trapezoid, rectangle, other quadrilateral)
- My shape has 1 short side and 2 long sides. It has 3 angles. Which shape could it be? (triangle)

Provide students with dry erase boards, dry erase markers, and a sock eraser. Read the next description and have the students draw a shape according to the description:

- Draw a shape that has 5 sides. Two sides are long, 3 sides are shorter. The shape has 5 angles.

Have students give a “thumbs up” signal when they have completed drawing the shape on the dry erase board. After students have drawn their shape, call out “1, 2, 3, Show Me!” Observe the shapes drawn and ask 3 volunteers to come to the front of the room and show their drawings. Ask the class to identify the shape and discuss the 3 drawings, comparing the sizes, shapes, and orientations of the drawings. Students should notice that though the drawings are similar and each represents a pentagon, the shape or orientation of the pentagon may differ. Repeat the activity with the following descriptions:

- Draw a shape with 4 equal side lengths and 4 equal angles. (square)
- Draw a shape with 4 angles. Each side is a different length. (any quadrilateral that meets the description. Square, rectangle, or any type of parallelogram would not work because of the requirement that each side have a different length.)
- Draw a side with 3 angles and 3 sides. The lengths of two of the sides are equal. (triangle)
- Draw a shape with 6 sides and 6 angles. (hexagon)

Give each student two index cards. Have the students draw a shape on one card and write a description of the shape on the second card. Place the students into groups of four. Have the students put their shape cards in the center of the group. One student will lead the group by reading his/her shape description aloud. The group will observe the shape cards to find which shape is being described. Each student will draw a copy of the shape on his/her dry erase board. The leader will call “1, 2, 3, Show Me!” Each student will display his/her dry erase board drawing for the group to review. The leader will lead a discussion among the group allowing members to share how they identified the correct shape. If one of the drawings does not match the description, the group should discuss which attribute is different and allow the student to
correct the drawing. Each student should have a turn at reading his/her shape description and leading the discussion.

Activity 4: Digital Scavenger Hunt (GLE: 21; CCSS: 2.G.1, W.2.7)

Materials List: Shape Scavenger Hunt BLM, magazines, pencils, cameras (digital, disposable, or instant), computer, *Word* or *PowerPoint* program or paper to make a shape book, optional: crayons, markers, construction paper

Put students into groups of 3 or 4 students. Give each group a Shape Scavenger Hunt BLM. For each shape, have the students search magazines to find pictures of items that represent each 3-dimensional shape. Have students cut out the pictures and glue them to the Shape Scavenger Hunt BLM. Allow students to share the pictures that they found for each shape. Provide each group a large piece of butcher paper.

If cameras are available, have students do a classroom scavenger hunt and take pictures of 3-dimensional objects that they find. Give each group a camera (digital, disposable, or instant) and have students in each group alternate taking pictures of the shapes they find. If camera access is limited, some groups may use magazines to find pictures while others are using the cameras. Create a class shape book using the photographs and magazine pictures. Print each picture and have the students write a sentence using the following sentences frame: “A trash can is the shape of a cylinder. It has two faces in the shape of circles.” If cameras are not available, students may search the Internet for photos of objects for each shape. Demonstrate how to save or copy the photo to a *Word* document or *PowerPoint* presentation and have the students type their sentence descriptions. Print the pictures to create a class book or combine the pictures into a slide show presentation. These pictures can also be used to assess students’ ability to identify 3-D shapes at a later date.

Activity 5: Grab Box (GLE: 21; CCSS: 2.G.1, W.2.8, SL.2.4)

Materials List: 2-dimensional shapes, a box with a hole in the top, math learning logs

Place 2-dimensional shapes in a box that has a hole in the top. Have students grab an object in the box (but don’t remove it from the box). Have them describe the attributes that they can feel. After they have described the item, ask them to guess the name of the shape that they are holding. After guessing, have them pull the object from the box to see if they were correct. Repeat the activity several times.

Have students draw the 2-dimensional shape that they chose in their math learning logs (view literacy strategy descriptions). Have students name the shape that they chose, and describe attributes that helped them identify the shape. Example: “I chose a hexagon. I knew it was a hexagon because it was flat and it had six straight sides.” Without naming their shape, students will read their descriptions to the class. Volunteers will try to identify the student’s shape.
according to his/her description of the attributes. If the descriptions aren’t clear enough to distinguish the correct shape, the student should revise the description to be more specific.

Activity 6: Fractions (GLE: 2; CCSS: RI.2.4)

Materials List: Fraction Strips BLM, two 9 × 9 square pieces of construction paper, scissors, crayons, math learning logs

Show the students a square piece of construction paper. Discuss the concept of a whole with the students. Write the phrase “1 whole square” on the square and display it. Show the students another square piece of construction paper. Fold the paper and cut it into two equal parts. Have the students describe what was done to the square and identify the number of pieces there are now. Show the students that the two pieces are equal in size by placing one piece on top of the other piece. Discuss with students that the square is now cut into parts which are called fractions. Tell students that when a shape is cut into two equal parts, it is cut into halves and each part is called one-half. Show the students how to represent the fraction numerically (½) explaining that the number 1 on the top (numerator) tells a number of equal parts being described, and the 2 on bottom (denominator) tells number of equal parts into which the whole is divided. The fraction ½ means “one part of two equal parts.”

Distribute the Fraction Strips BLM. Follow the directions below for each square:

a. Have students color the first strip and write “whole” on the line above the strip and the numeral 1 inside the strip.

b. On the line above the second strip, the students will write “halves.” Have the students color one-half and write the fraction ½ on each part of the strip.

c. For the remaining strips, have students identify how many parts there are and the name for the parts (thirds, fourths, fifths, and sixths). Have students color one part of each strip and label the parts with the appropriate fraction (\( \frac{1}{3} \), \( \frac{1}{4} \), \( \frac{1}{5} \), \( \frac{1}{6} \)).

As students color each of the fractions, ask them to tell what they notice about the sizes of each piece. Discuss that when the shape is cut into more pieces, the pieces will be smaller. In their math learning logs (view literacy strategy descriptions), have students explain why \( \frac{1}{2} \) of the strip is greater than \( \frac{1}{4} \) of the same strip.

Create vocabulary cards (view literacy strategy descriptions) for the following words: fraction, halves, thirds, fourths, fifths, and sixths. Add these cards to the vocabulary cards collection created in Unit 1. Write the unit number or color a dot on the back to indicate the concept to which these cards relate. Be sure to allow time for students to review their cards individually and with a partner in preparation for other class activities and quizzes.
Activity 7: Circular Fractions (GLE: 2)

Materials List: Fraction Circles BLM, 5 paper plates, scissors, paper bag, marker, cardstock

Cut one paper plate into two unequal parts. Ask, “Is this plate divided into halves? Why?” (No, the parts are not exactly the same size.) Demonstrate to students how to cut paper plates into halves, thirds, fourths, fifths, and sixths. Point out that each of the fraction pieces must be the same size as the others. Demonstrate this by stacking the matching pieces together.

Have four more plates cut into thirds, fourths, fifths, and sixths. Display the plate cut into thirds. Ask students to tell how they can find the fraction for the parts. Choose two students to count the number of pieces and place them in the shape of a circle to determine that the pieces make one whole plate. Call on students to name and write the appropriate fraction on each plate piece. Repeat this for the plate cut into fourths, fifths, and sixths.

Divide the class into groups of four. Give each group a Fraction Circles BLM copied on cardstock. Have students label each part of the circle with the correct fraction ($\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{1}{6}$) and cut the circles apart. Have each group put all of their pieces in a paper bag, shake them up, and pour them out. When the signal is given, the students will race the clock to see if they can put the fraction circles back together in two minutes. Call out “go” and time the students for two minutes. At the end of two minutes, call out “stop.” Have groups that were successful share their strategies for putting the circles together. If students combine different fractions to make a circle (ex. $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{4}$), lead a class discussion to demonstrate that $\frac{1}{2}$ of the circle is the same as two $\frac{1}{4}$ pieces. Play again until all of the groups are successful in completing the circles in two minutes. For a challenge, add more fraction circles, shorten the time, or use fraction circles that are not labeled. If a group has difficulty, guide them to sort the pieces by fractions and then arrange the pieces into a circle.

Activity 8: Halves, Thirds, and Fourths (GLE: 2; CCSS: SL.2.1a, b, c)

Materials List: 4 pieces of 9 $\times$ 9 construction paper, scissors, Fraction Shapes BLM, pencils

Ask students to tell how a piece of construction paper can be cut in half. Have students suggest different ways to cut the paper (such as vertically, horizontally, or diagonally). Cut the squares according to student directives. Have students check the halves to see that they are equal even if parts need to be rotated.

Give each student a copy of the Fraction Shapes BLM. Have students show different ways to divide each shape into halves, thirds, or fourths by drawing a line to represent the cut. Allow students time to consider all options for representing the fractions. Using the “Think Pair Square Share” discussion (view literacy strategy descriptions) have partners share the ways they divided their shapes to represent each fraction. Each partner should listen carefully to the explanations and check to be sure that his/her partner has divide the shapes equally (or as close to equal as
possible) to represent the fractions. Partners should ask for more information as necessary. Combine the partners into groups of four to share their ideas and discuss new ways that the shapes could be divided. Each group member will share one way he/she divided the shape as the other members listen. Group members may add to the explanation or request more information as they take turns sharing. Allow the groups time to share and compare their ideas with the rest of the class. As new ideas are presented, have students record these ideas on their Fraction Shapes BLM.

Activity 9: Parts of a Whole (GLE: 2; CCSS: RI.2.1)

Materials List: paper, pencil, linking cubes of two colors, crayons of the same 2 colors, Tower Fractions BLM, learning logs

Give each pair of students 36 linking cubes (18 of each color). Have each pair of students link six cubes of one color (ex.: blue). Identify the cube tower as one whole, or the fraction 6/6. Have students make a new tower with 5 blue cubes and a cube of a different color (ex.: red). Have the students name the fraction for the part that is red. Discuss that if \( \frac{1}{6} \) of the tower is red, then the remaining cubes could also be described with a fraction. Discuss how to write the fraction \( \frac{5}{6} \) to show how many of the cubes are blue. Have students continue to build towers for \( \frac{2}{6} \) red, \( \frac{3}{6} \) or \( \frac{1}{2} \) red, \( \frac{4}{6} \) red, \( \frac{5}{6} \) red and \( \frac{6}{6} \) red. After building each tower, have the partners discuss the parts of the tower and name the fractions that represent the red and blue cubes. Give each student a copy of the Tower Fractions BLM. Have the students color the squares of the graph paper to depict the towers that they created. Have students write the fractions that represent each color in the towers.

Have six students come to the front of the class. Have two students kneel and the other four stand. Ask, “What fraction of the group is standing? What fraction of the group is kneeling? What fraction of the group is boys? What fraction of the group is girls?”

In their math learning logs (view literacy strategy descriptions), have students draw a picture of their family and write a sentence that describe their family using fractions (e.g. I am \( \frac{1}{4} \) of my family, \( \frac{1}{2} \) of my family is boys, my parents are \( \frac{2}{5} \) of my family.) Have students share their drawings with a partner. Students will ask their partners questions about their family pictures that can be answered using fractions. (e.g., What fraction of my family has long hair?)

Activity 10: Fraction Towers (GLE: 2)

Materials List: per pair of students red, blue, yellow, and green cubes (5 of each color), Color Tower Strips BLM, index cards, sticky notes
For each pair of students, copy and cut the Color Tower Strips BLM. Give each pair of students red, blue, yellow, and green cubes (5 of each color) and a set of color tower strips. Partner A will choose a strip and read it to Partner B. Partner B will use the cubes and follow the directions to build a cube tower. The partners will work together to find the fraction of the final color to complete the tower.

Divide students into groups of four and have each team make a fraction tower with 6 cubes using at least 3 colors. Have each team write a text chain describing its tower on an index card. After students have completed their text chains, place all of the towers on display for the class. Number the towers with a sticky note and record which tower belongs to which group. Each group will read its text chain to the class. Students will use the clues from the text chain to determine which tower belongs to each group.

Sample text chain:

| Student 1: Our tower is \( \frac{2}{6} \) red. |
| Student 2: Our tower is \( \frac{1}{6} \) blue |
| Student 3: Our tower is \( \frac{1}{6} \) green. |
| Student 4: Our tower is \( \frac{2}{6} \) yellow. |

Which tower did we build?

Sample Assessments

Performance and other types of assessments can be used to ascertain student achievement. Following are some examples.

General Assessments:

- Have students name the shapes and describe the attributes of the shape such as number and types of faces, number of vertices or angles, and number of edges or sides. Show different shapes such as a triangle, quadrilateral, pentagon, hexagon, cube, sphere, cone, cylinder, rectangular prism, and pyramid.
- Have students make a Shape Book by gluing pictures of 3-dimensional objects into a booklet.
- Have students put puzzles together that involve fractional pieces. (For example: Pizza that has been cut into fourths)
Activity-Specific Assessments:

- **Activities 1 and 4**: Have the students create a list or chart of real-life objects of each solid shape studied. Display a word bank including the names of the 3-dimensional shapes. Hold up a 3-dimensional object. Have the students write down the 3-dimensional shape name. Have the students make up solid-shape riddles for others to guess. Example: I have 6 faces that are the same size, 8 vertices, and 12 edges.

- **Activity 2**: Give students a copy of the Shapes Variations BLM. Have them identify the shapes by writing the following code on each shape: T = triangle, Q = quadrilateral, P = pentagon, H = hexagon.

- **Activity 10**: Given a set of fraction clues (similar to the Color Tower Strips in Activity 10), have students build fraction towers using linking cubes or color fraction towers on graph paper.
Grade 2
Mathematics
Unit 7: Measurement in Our World

Time Frame: Approximately five weeks

Unit Description

Measurement tasks are extended to more precise measures, and standard measures for capacity and weight/mass are introduced and used. The focus at this grade level is on gaining a strong feeling for selecting standard tools and units and using them to measure length, weight/mass, and capacity in standard metric and customary units. Some comparisons are made within the same system. An understanding of area is developed as non-standard units are used to cover regions of various shapes and sizes.

Student Understandings

Students select appropriate tools and standard units for measuring length, perimeter, weight/mass and capacity. Students use the appropriate tool to measure objects to the nearest inch, centimeter, foot, meter, cup quart, liter, pound, and kilogram. They make simple comparisons within the same system. Students are introduced to the concept of area as they cover regions with non-standard units.

Guiding Questions

1. Can students select units and tools for measuring length, perimeter, weight/mass and capacity?
2. Can students measure to the nearest unit to find length, perimeter, capacity, and weight/mass (i.e., inch, centimeter, foot, cup, quart, liter, pound, and kilogram)?
3. Can students compare units within the same system (i.e. inch shorter than a foot, day shorter than a week, cup holds less than a quart)?
4. Can students estimate lengths?
5. Can students construct and read line plots?
6. Can students cover a given region using non-standard units?
### Unit 7 Grade-Level Expectations (GLEs) and Common Core State Standards (CCSS)

<table>
<thead>
<tr>
<th>Grade-Level Expectations</th>
<th>CCSS Text</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number and Number Relations</strong></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Recognize, select, connect, and use operations, operational words and symbols (+, −) for addition (join, part/part/whole) or subtraction (take away, comparison, missing addend, and set/subset) situations (N-6-E) (N-5-E)</td>
</tr>
<tr>
<td>9.</td>
<td>Add and subtract 1- and 2-digit numbers (N-6-E) (N-7-E)</td>
</tr>
<tr>
<td><strong>Measurement</strong></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Measure and appropriately label measures of length and perimeter (i.e., inch, centimeter, foot), capacity (i.e., cup, quart, liter), and weight/mass (i.e., pound, kilogram) (M-1-E)</td>
</tr>
<tr>
<td>17.</td>
<td>Select and use appropriate tools and units to measure length, time, capacity, and weight (e.g., scales for pounds and kilograms; rulers for inches and centimeters; measuring containers for cup, quarts, and liters) (M-2-E)</td>
</tr>
<tr>
<td>18.</td>
<td>Use non-standard units to cover a given region (M-2-E)</td>
</tr>
<tr>
<td>20.</td>
<td>Compare units within the same system (inch is shorter than a foot, minute is shorter than an hour, day is shorter than a month, cup holds less than a quart) (M-3-E)</td>
</tr>
<tr>
<td>26.</td>
<td>Construct and read line plots and tables (D-2-E)</td>
</tr>
<tr>
<td><strong>Math CCSS</strong></td>
<td></td>
</tr>
<tr>
<td>2.OA.4</td>
<td>Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.</td>
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<tr>
<td><strong>Measurement and Data</strong></td>
<td></td>
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<tr>
<td>2.MD.2</td>
<td>Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.</td>
</tr>
<tr>
<td>2.MD.3</td>
<td>Estimate lengths using units of inches, feet, centimeters, and meters.</td>
</tr>
<tr>
<td>2.MD.4</td>
<td>Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.</td>
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<tr>
<td><strong>ELA CCSS</strong></td>
<td></td>
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<tr>
<td>RI.2.1</td>
<td>Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.</td>
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<tr>
<td>Writing Standards</td>
<td></td>
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<tr>
<td>---------------------------</td>
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<tr>
<td>W.2.1</td>
<td>Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section.</td>
</tr>
<tr>
<td>W.2.2</td>
<td>Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.</td>
</tr>
<tr>
<td>W.2.8</td>
<td>Recall information from experiences or gather information from provided sources to answer a question.</td>
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<thead>
<tr>
<th>Speaking and Listening Standards</th>
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<tbody>
<tr>
<td>SL.2.1</td>
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<td>SL.2.4</td>
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<td>L.2.4</td>
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</table>

**Sample Activities**

**Activity 1: Non-standard and Standard Units (GLEs: 14, 17; CCSS: 2.MD.3, RI.2.1, W.2.2)**

Materials List: chart paper, marker, cubes, box of paper clips, box of pencils, shoes, box of crayons, bag of pennies, How Big Is a Foot by Rolf Myller, ruler, Inch Ruler BLM (copied on legal paper), pencils, bag of items to measure per group (i.e. cube, penny, crayon, eraser, tens rod, marker), Measuring in Inches BLM, math learning log

Prior to this lesson, copy the Inch Ruler BLM onto legal sized paper. There are two rulers per page. Each student will need 1 ruler. Due to printer variances, the accuracy of the ruler may be slightly off. Check the printed rulers with a standard ruler. If preferred, standard rulers may be used to measure the objects in this activity.
Present the following problem to the students: “I want to find the length of my desk. What can I use to find out how long my desk is?” Students may suggest using a ruler, paper clips, pencils, fingers, cubes, etc. Record students’ suggestions on a piece of chart paper. Divide the class into groups of 3 or 4 students and assign each group a non-standard unit to measure the length of a student desk. Groups may use cubes, paperclips, pencils, crayons, shoes, pennies or other sets of available items. Observe groups as they measure to provide assistance with aligning the non-standard units along the length of a desk as needed. As the measurements are completed, record the length of the desk for each non-standard unit on the chart paper. Have students discuss why the measurements are different using the following guiding questions:

- Are some of the desks larger than others? How do you know? (No, when they are lined up next to each other, they are the same length.)
- Why did it take fewer pencils than cubes when measuring the desk? (The pencils are longer than the cubes so you don’t need to use as many pencils to measure.)
- How could measuring with pencils or shoes be a problem? (Some pencils or shoes may be smaller or shorter than others, so you won’t always get the same measurement.)

Read the book How Big Is a Foot by Rolf Myller or another story that introduces the need for standard units of measure. In this narrative story, a king wants to build a new bed for the queen. He measures the size he wants the bed to be, using his own foot. When he gives the instructions to the bed-maker, the bed-maker measures the materials using his own feet, which are much smaller than the king’s. The bed turns out to be way too small for the queen, so the bed-maker is thrown in jail. After reading the book, lead the class in a discussion about why the bed did not fit the queen and why it is important to use a standard unit for measuring.

Display a foot ruler. Discuss that a ruler is used to measure length in standard units of inches and feet. Have students describe what they see on the ruler (numbers through 12, long lines and shorter lines, numbers). Explain that the ruler is 1 foot in length, the distance between each number on the ruler is 1 inch, and there are 12 inches in 1 foot.

Distribute a ruler from the Inch Ruler BLM to each student. Have students cut out the ruler. Have the students use two crayons to mark the inches in alternating colors, using one color to color the length between 0 and 1, and another color to mark the length between 1 and 2, and so forth. Have students measure the width of two fingers by placing them on the ruler at the 0 mark. The measurement should be close to 1 inch. Explain that they can use the width of two fingers to estimate the length of an object in inches. Have students use two fingers to estimate the length of their pencils.

Model how to align the ruler correctly for measuring. Ask students to align the ruler to their pencil to measure how long it is. Observe as students align the ruler and assist those that have not aligned it correctly. Have students find the length of their pencil to the closest inch. Discuss that the shorter marks between the inches indicate $\frac{1}{2}$ of an inch. If the length of an object passes the half-inch mark, the object would measure closest to the next inch. If the length of the object falls short of the half-inch mark, the closest inch measurement would be the inch that the object length is just past. Have students compare their original estimates to the measured length.
Put students into pairs. Give each group a bag with several items to measure to the nearest inch (i.e. cube, penny, crayon, eraser, tens rod, marker) and a Measuring in Inches BLM. Have the students estimate the length of each object and then measure each item to the nearest inch, recording their findings on the BLM. After the groups have measured each item, compare the estimates and measurements. Ask students to discuss how close the estimates were to the actual measurements and why each groups’ actual measurements were all the same. (They all used the same standard unit to measure the objects.) Record the measurements on chart paper to compare to centimeter measurements that will be taken in Activity 6.

Have students respond in their math learning logs (view literacy strategy descriptions) to the question: Why do we need to use standard units when we are measuring? After students have had time to respond, allow them to share their ideas with the class.

Collect the inch rulers and laminate them for use in future lessons.

**Activity 2: Comparing Measurements (GLE: 9, 14, 17; CCSS: 2.MD.4; SL2.1a, b, c)**

Materials List: inch rulers, measuring tapes or yardsticks, pencil, string, Comparing Measurements BLM, Line Comparisons BLM, crayons

Show the class two lengths of string (of two different colors if available), asking them to tell which string is longer. Present the following question to the students, “What is the difference in the lengths of the two strings?” Using the “Think Pair Square Share” form of discussion (view literacy strategy descriptions), have the students discuss with partners how to determine how much longer the long string is compared to the short string.

Give each pair of students two strings, one measuring 6 inches and one measuring 9 inches. Have the students use their inch rulers to discover the difference in the lengths of the two strings. Observe partners as they investigate the concept, taking note of the different strategies that may be used (possible solutions include laying the two strings side by side and measuring the longer part of the string, measuring both strings and subtracting to find the difference in inches, cutting the “extra” amount of string and measuring only that part, laying both strings next to a ruler and counting the number of inches for the difference of the two string lengths, etc.)

Have the students complete the Comparing Measurements BLM with their partner. After students have written their explanations, have each pair square up with another pair of students to form a group of four and discuss and compare their findings and the processes they used. After students have discussed in groups of four, allow the groups to share and demonstrate their investigations to the class. Be sure that students who have found different ways present their ideas so that the class understands that there is more than one way to find the difference, but the difference will be the same if an appropriate method is used. After students have shared, discuss which methods might work best for comparing measurements of larger objects or things that cannot be easily altered by cutting or moving them. Lead students to agree that using subtraction is an effective process for finding the differences in lengths.
Give each pair of students a Line Comparisons BLM. Working with a partner, have the students use their inch rules to measure the lines and answer the comparison questions. When all students have finished, review the answers and allow partners to share how they found the differences in the lengths of the lines.

**Activity 3: Measuring Me (GLE: 9, 14, 17; CCSS: 2.MD.4; W.2.1)**

Materials: inch ruler, measuring tapes or yardsticks, pencil, Measuring Me BLM, Taller/Shorter/Longer BLM, index cards, math learning logs

Pair students with partners. Give each pair a yardstick or measuring tape. Give each student a Measuring Me BLM and his/her inch ruler created in Activity 1. Have students assist each other in measuring the different parts of each student’s body using yardsticks, measuring tapes, or rulers and record the measurements using inches on the BLM. After all students have been measured, have the partners record their information in the table on the Taller/Shorter/Longer BLM (1 per student). Each student will use subtraction to find the differences of the measurements in inches, recording the answers on the BLM.

Have each student share his/her height one at a time. As the students share their heights, have them decide whether their height is taller or shorter than the previous student’s height. Have students line up in order from tallest to shortest based on measurement comparisons. Record each student’s name and height in inches on index cards to be used in Activity 3.

In their math learning logs ([view literacy strategy descriptions](#)), have the students respond to the following SPAWN ([view literacy strategy descriptions](#)) prompt:

**Special Powers:**
You have the power to make yourself taller or shorter. Would you choose to be taller or shorter, why, and what would be better about being taller or shorter? Answer the question in paragraph form. Be sure to explain your choice and state your opinion of whether you think it would be better to be taller or shorter, give reasons to support your opinion, use linking words to connect your reasons to your opinion, and provide a concluding statement. You may also illustrate your writing.

After students have completed their SPAWN writing, allow volunteers to share their opinion writings with the class.

**Activity 4: Line Plots (GLE: 9, 14, 26; CCSS: RI.2.1)**

Materials: index cards with the height of each student recorded from Activity 3, chart paper, inch ruler from Activity 1, Line Plot BLM, math learning log

Give each student the index card with his/her height written on it. Have students recall who was the shortest person when they lined up according to height in the previous activity. Ask that
student to state how tall he/she is in inches. Record this number on a piece of paper and lay it on the floor in front of the group. Ask the tallest student to share his/her height. Record this number on another sheet of paper and lay it on the floor, leaving space to fill in the numbers in between. Create a number line by writing each number that falls between the two heights on separate sheets of paper and by placing them evenly spaced between the two numbers.

Ask the students how they could find out how many students are each height. Guide the students to conclude that they could line up behind the number that represents their height. Call out each of the numbers and have the students that are that height line up behind the number. As students line up, have them notice that some lines may have the same number of students in them but they seem to be different lengths due to spacing. Ask students how it might be easier to see the number of students for each height. Lead students to suggest that their index cards could be lined up behind the number for their heights. Have students place their cards on the floor where they are in the line and then return to their seats. The students should notice that it is now easier to see the data. If the cards are not equally spaced, ask probing questions to help students understand that the cards should be equally spaced so that the data will be easy to interpret. Ask students to tell what they notice about the data. (Most students are 51 inches; the same number of students are 48 and 50 inches; no one was 55 inches, etc.) Discuss each idea that is shared and ask students to explain how they came to that conclusion.

Explain to students that another way to show this same data is to show it on a number line. A line plot is a picture of information shown on a number line. Demonstrate how to create a line plot using the range of student heights in inches found in Activity 3. On chart paper, draw a horizontal line and create points of equal distance on the line for the range of student heights in inches. Label each point from left to right with a number, with the shortest height being the farthest point to the left and the tallest height on the right.

Example: The shortest student is 47 inches and the tallest student is 58 inches:

```
47 48 49 50 51 52 53 54 55 56 57 58
   X   X   X
   X   X   X   X
   X   X   X   X
   X   X   X   X   X
```

Explain that the numbers listed represent a scale for the information that was collected. In this activity, the numbers represent the heights of the students. The data is recorded by placing an X in the column above the number. Have each student place an X above the line in the column of the number that represents his/her height. After recording the data, ask students to tell what each X represents on the line plot. Guide students to connect that each X represents a student in the classroom with the height in the column where the X is placed and that the total count of Xs matches total number of students. Ask the students to share what they notice about the data displayed on the line plot and compare it to the data displayed using the index cards. Students should notice that the data is the same; it is just represented in a different way.
Model how to use Questioning the Content (QtC) (view literacy strategy descriptions) when reading and interpreting data on a line plot. Ask the following questions about the line plot, allowing students to discuss their answers with partners and then sharing their ideas with the class. The following questions are examples that may be used for QtC using the data on a line plot (see line plot example above). Write these questions on chart paper and display them in the classroom. While using line plots, refer to these questions to remind students about the information that a line plot displays.

- What information is shown on this line plot? (the height of students in inches)
- What scale is shown on this line plot? (47 in. to 58 in.)
- How can you find how many pieces of data were collected? How many pieces of data were collected? (count the Xs; 21)
- What was the tallest height measured? (58 inches); the shortest? (47 inches)
- Which height occurs most frequently? (51 inches)
- Which height occurs least frequently? (55 and 57 inches, they both have no students)
- How many students were 47 to 52 inches tall? (14)
- What is the difference in the tallest height and the shortest height? (58 – 47 = 11 inches)

Place the students in pairs. Give each pair of students a bag containing 15 strings cut to lengths between 5 and 10 inches, a Line Plot BLM, and his/her Inch Ruler (created in Activity 1). Have the students measure each string in the bag to the nearest inch and record an X on the line plot for each length of string. After completing the line plot, have students create their own questions about the data using questions similar to the QtC chart. Have each pair trade papers with another pair of students and answer the questions that were created. After the pairs have answered the questions, have them return the papers to the original students and discuss the questions and answers. If other students were unable to answer certain questions, have the students who wrote the questions discuss what answer they were expecting and ways to make the questions clearer.

In their math learning logs (view literacy strategy descriptions) ask the students to explain the following question: How could you find the total length of all of the strings? For this question, students are not expected to calculate the total length of the strings, but should explain a way to find it. Answers may include adding up the lengths of each string, laying all of the strings end to end and measuring them as one length, or finding the total lengths in each column and then adding the totals in the columns. Allow students to share or demonstrate their responses with the class.

Activity 5: Measuring Bug Town (GLEs: 8, 9, 14, 17, 20; CCSS: 2.MD.2, 2.MD.4)

Materials List: masking tape, scissors, marker, inch rulers (from Activity 1), yardsticks, Road Lengths BLM, Road Length Problems BLM

Prior to the lesson, use masking tape to create “roads” around the classroom by placing measured lengths of tape on the floor and labeling the tape with the street names. Use the following street names and lengths.
Distribute the inch rulers that the students created in Activity 1. Remind students that the length of the ruler is one foot. Ask students to tell how many inches are in one foot. (12) Distribute the Road Lengths BLM and have students record the number of inches that are equal to one foot (12). Have students recall some of the items that were measured using the inch ruler in Activity 1. Discuss that inches are good for measuring small items, but larger items can be measured with larger units, such as feet and yards.

Put students into groups of 4 or 5 students. Give each group a yard stick and have them use their inch rulers to determine how many feet are equal to one yard. Assist students in aligning 3 rulers end to end along the yard stick to measure it if needed. Show students that every 12 inches on a yardstick is equal to 1 foot. Have them record the number of feet equal to one yard on the BLM (3). Using the yardstick, model how to measure the length of a larger object, determining the length in inches and in feet.

Tell the students the following anecdote: “Have you ever thought what it would be like to be an ant? Today you are going to find out what it is like to live in Bug Town. The bugs have begun to create a town in our classroom and have built some roads (refer to the masking tape on the floor). Let’s see how long their roads are!” Have the students work in their groups to measure each of the roads using their inch rulers, yardsticks, or measuring tapes. Have them determine if the road is greater than, less than, or equal to 1 yard. Students may use a yardstick to determine this information or use the measurement in feet to compare. Observe students as they measure to be sure that they are using the tools correctly. Students may measure using one ruler by marking the end of the ruler and moving it, or by laying multiple rulers end to end. If measuring with yardsticks or measuring tapes, students should determine that every twelve inches represents one foot. After the groups have measured each road, have them share and compare their measurements in inches and feet with the class. If there is a discrepancy in measurements among the students, select a student to be the “verifier.” Observe as the verifier re-measures the road to find the correct length. Students should make corrections on their paper if needed. Ask students to identify the roads that are 1 yard or longer. Ask students the following questions about the measurements found:

- How does the size of an inch compare to the size of a foot?
- Why do you think you had two different measurements for the same road?
- When you measured the roads, did it take more feet or more inches? Why?
Distribute the Road Length Problems BLM to each student. Have students complete the questions using the measurements that were recorded on the Road Lengths BLM. Students may draw pictures, draw base-10 models, create number lines or use other addition and subtraction strategies to solve these problems. Students should calculate answers using the unit of measurement indicated in the problem.

Collect the inch rulers for use in future lessons.

**Activity 6: Centimeters** (GLEs: 14, 17; CCSS: 2.MD.2, 2.MD.3, W.2.2)

Materials List: centimeter ruler, inch ruler, meter stick, yardstick, Centimeter Ruler BLM (copied on card stock), Inch Rulers (created in Activity 1), crayons, Centimeter Measurements BLM, math learning logs

Prior to this lesson, copy the Centimeter Ruler BLM onto legal sized paper. There are two rulers per page. Each student will need 1 ruler. Due to printer variances, the accuracy of the ruler may be slightly off. Check the printed rulers with a standard ruler. If preferred, standard rulers may be used to measure the objects in this activity.

Ask, “What units have been used to measure length so far?” (inches, feet) Explain that these units are the customary units typically used in the U.S. for measuring length, but that many parts of the world use another system of measurement known as the metric system. Show students a centimeter ruler and a meter stick. Give each student a ruler from the Centimeter Ruler BLM and write “centimeter” on the board. Show students that 1 centimeter is about the size of the width of their little finger. Have students cut the ruler and then color each centimeter on the ruler using two alternating colors. Show students the meter stick. Have students compare inches to centimeters, yards to meters, and describe the comparisons.(Inches are larger than centimeters, two centimeters are almost equal to 1 inch, a yard and a meter are close to the same length, a meter is a little longer than a yard.) Ask students to discuss whether the same objects that were measured in Activity 1 using inches would have the same measurements using centimeters. (No, since centimeters are smaller, it would take more centimeters to measure the same object.)

Model how to estimate centimeters using the width of your little finger. Divide the class into pairs of students. Using the same objects measured in Activity 1, give each pair a bag with several items to measure to the nearest centimeter (i.e. cube, penny, crayon, eraser, tens rod, marker). Have the pairs use their little fingers to estimate the number of centimeters for the length of each object and then measure the objects to the nearest centimeter with their centimeter rulers, recording their estimates and measurements on the Centimeter Measurements BLM. After measurements are completed, record the centimeter measurements next to the inch measurements on the chart created in Activity 1. Compare and discuss the measurements in centimeters to the measurements in inches. Ask students to tell why the centimeter measurement seems larger than the inch measurements. (Centimeters are a smaller unit and more are needed to measure the same object.) Ensure that students understand that the length of the object did not change, but the size of the chosen unit affects the measurement outcome.
In their math learning logs (view literacy strategy descriptions), have students draw a line and measure it using their Inch Ruler and Centimeter Ruler, recording the measurements in their learning log. Have the students write an explanation of why the measurements differ and how the measurements relate to the size of the units used. After students have completed their writings, allow them to share and discuss their ideas with the class. Collect the student Centimeter Rulers and laminate them for use in future lessons.

Activity 7: Metric Measurements (GLEs: 14, 17, 20; CCSS: 2.MD.2, 2.MD.3)

Materials: meter sticks, play area with objects that can be measured, Metric Measurements BLM

Prior to the activity, use a red marker to highlight the 50 centimeter mark on the meter sticks. Show the students a meter stick and ask them to name the tool and examples of objects that it can be used to measure. Divide the class into groups of 3 or 4 students and give each group a meter stick. Ask students to observe how many centimeters are equal to 1 meter (100 centimeters). Have students use the meter stick to find a part of their body that is about 1 meter long to identify a “benchmark” they could use when estimating the length of an object in meters (arm span). Using a bookshelf or the length of the board, have a student estimate the length in meters and then model how to measure the length in meters using the meter stick. Explain that the 50 centimeter mark is half a meter. Discuss how to identify the nearest meter when measuring an object by determining if the object is more or less than the half-meter mark. Ask students to estimate about how many centimeters the object would be. (If it were about 3 meters, it would be about 300 centimeters. Students could count by hundreds.) Then have a student measure again in centimeters. Have the students discuss why the estimates are different from the actual measurements.

Take the groups outside to the playground. If a playground is not available, set up an area with objects that can be measured using meters (such as a jump rope, two cones spaced apart, a hopscotch course, etc.) Provide each group with a Metric Measurements BLM. Have the students identify five objects that could be measured using meters and fill in the name of the object on the BLM. Have students estimate the measurements in meters and centimeters. (Ex.: The slide is about 4 meters long, so it would be about 400 centimeters long.) Then have students measure the objects using the meter stick and record the measurements to the nearest meter and centimeter. Discuss with students the differences in the measurements for meters and centimeters. Ask students to explain why it takes more centimeters than meters to measure an object.

Activity 8: Long Jump (GLE: 14, 26; CCSS: RI.2.1)

Materials List: chalk or masking tape, centimeter rulers or meter sticks, Long Jump BLM, index cards, pencils

Review the use of a line plot for recording and interpreting data. Ask the following questions:
How can a line plot be used to show data? (It shows how many times something happens.)
How do you create a line plot? (Draw a number line. Label the scale for the data. Place an X over the number each time it occurs.)

Tell the class that they are going to participate in a long jump activity. Explain that professional athletes compete in a long jump competition in the Olympics. Place students into groups of 3 or 4. Provide each group with a Long Jump BLM, and a centimeter ruler or meter stick. Draw or tape a starting line on the ground or floor. Instruct the jumper to place his/her toes at the starting line. Have the jumper jump as far as possible with both feet together. Have the other team members work together to measure the jump distance from the starting line to the back of the heel. Have students record the jump length in centimeters on the Long Jump BLM. Allow each student to complete 3 jumps.

After collecting all of the measurement data, have each group work together to create a line plot. Have the students determine the scale for the line plot by filling in the the shortest and longest jump distance on each end of the line plot. Have them fill in the remaining numbers equally spaced on the line plot. Have the students mark an X for each of the jump distances recorded.

After students have completed the line plots, provide each group with 4 index cards. Have the students create questions about their line plots (ex.: What was our longest jump? What length of jump was most frequent?). Display each group’s line plot for the class. Allow the groups to ask their questions of the class and to select students to answer the questions using data from their line plots.

**Activity 9: Choosing the Best Unit and Tool (GLE: 17; CCSS: RI.2.1, W.2.2)**

Materials List: glue sticks, pencils, Which Unit and Which Tool? BLM, Measurement Riddles BLM, 4 × 4 construction paper squares, math learning log

*Teacher Note: This is an ongoing activity that may be started at any time during this unit. As new measurement units are introduced, be sure that students add the new information to this table. The Which Unit and Which Tool? BLM may be glued into students’ math learning logs for easy access by the students.*

Place a chair in front of the class and ask students the following question: “What are some ways you could measure this chair?” Ask students to discuss with partners some of the ways that the chair could be measured. Call on volunteers to share their ideas and/or demonstrate how they would measure the chair. Encourage students to think of as many possible ways the chair could be measured (e.g., height from floor to top of the chair back, length of the legs, width of the seat, depth of the seat, weight).

Display a 4-column table titled “Which Unit and Which Tool Do I Use?” with the following headings for each column: Measured Attribute, Standard Units, Metric Units, Tools. This table will be used as a graphic organizer (view literacy strategy descriptions) to help students easily
connect the attributes of measurement with the appropriate units and tools of measurement. *Graphic organizers* are used to help students organize information in a visual display that makes the information easier to learn or understand. Other examples of *graphic organizers* include Venn diagrams, flow charts, webs, t-charts, and KWL charts. *Graphic organizers* allow students to assimilate new information learned in a visual and logical form. As students become more comfortable with their use, the student should be able to apply the use of a *graphic organizer* to other lessons or content areas. To use a *graphic organizer*, select one that suits the content that the students are learning. Distribute or display the *graphic organizer* (either blank or partially completed). Introduce the logic for using the particular format and show students how the information that they are about to learn can be organized using the selected format. As the content is presented, guide students in completing the *graphic organizer*. Students may work with partners in order to promote oral language skills. After completion, show students how the *graphic organizer* can be used as a study aid for reviewing ideas, details, and processes. Assessments should include the *graphic organizer* to reinforce the value of organizing information visually.

Tell students that throughout the unit, they will be learning many different ways to measure different things. Provide a copy of the Which Unit and Which Tool? BLM for each student. Explain that this table will be used to help them organize the information they will be learning so that they can understand it easier. Discuss and complete the information in the first row of the displayed table as students complete the information on their copy.

<table>
<thead>
<tr>
<th>Measurement Attribute</th>
<th>U.S. Customary Units</th>
<th>Metric Units</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length</strong></td>
<td>Inches</td>
<td>Centimeters</td>
<td>Ruler</td>
</tr>
<tr>
<td><strong>Height</strong></td>
<td>Feet</td>
<td>Meters</td>
<td>Yard stick</td>
</tr>
<tr>
<td><strong>Width</strong></td>
<td>Feet</td>
<td></td>
<td>Measuring tape</td>
</tr>
<tr>
<td><strong>Perimeter (added in activity 14)</strong></td>
<td>Yards</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>Pounds</td>
<td>Kilograms</td>
<td>Scale</td>
</tr>
<tr>
<td><strong>Mass (added in Activity 11)</strong></td>
<td></td>
<td></td>
<td>Pan balance</td>
</tr>
<tr>
<td><strong>Capacity (added in Activity 13)</strong></td>
<td>Cups</td>
<td>Liters</td>
<td>Measuring cups</td>
</tr>
<tr>
<td></td>
<td>Quarts</td>
<td></td>
<td>Pitchers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Containers</td>
</tr>
</tbody>
</table>

Have students glue this BLM into their math *learning logs* ([view literacy strategy descriptions](#)). Students will revisit the graphic organizer to add more information as it is learned.

After all of the tools and units have been introduced, allow students to review their “Which Unit and Which Tool?” BLM and select one of the measurement tools. Review the *RAFT writing* ([view literacy strategy descriptions](#)) acronym and procedures with students. Assign the following
RAFT writing for the students to complete in their math learning logs (view literacy strategy descriptions):

- Role – Measurement Tool
- Audience – Class
- Form – Riddle
- Topic – How the tool is used for measuring

Have the students select a measurement tool. Have students write a riddle from the point of view of the measurement tool, providing information about what types of objects and attributes you would measure, who might use you to measure something, what units you can measure, etc.

Sample of RAFT writing:
I can measure in inches, feet, and centimeters. A carpenter might use me to measure a board or a wall. I am really good at measuring the length of short objects, like your book or your pencil. Line me up on one side of an object and I will tell you how long it is.
Which tool am I? (ruler)

After completing the RAFT writings, have the students share their riddles with the class, allowing classmates to guess the measurement tool being described. If students’ RAFT descriptions are incomplete, the class may ask questions to gather more information before guessing the selected tool. The student should add any new information to their RAFT to make it more accurate.

Provide the students with a Measurement Riddles BLM. Have them draw their measurement tool in the box and rewrite their RAFT on the lines. Glue a 4 × 4 inch square piece of construction paper over the drawing. Combine the riddles into a book to be placed in the classroom library.

Activity 10: Pounds (GLE: 14)

Materials List: examples of 1-pound objects (loaf of bread, bag of coffee), objects to weigh (text book, picture book, pack of markers, pack of crayons, notebook, ball, toy car, bag of beans, box of baking soda, etc.), pan balance, mechanical kitchen or bathroom scale, Pounds BLM

Collect several examples of objects weighing one pound (loaf of bread, bag of coffee, box of baking soda, can of beans, bag of pasta, and box of powdered sugar). Allow students to handle the objects and determine what a pound feels like in their hands. Put students into groups of 4. Give each group several objects, a 1-pound item, a pan balance, and a Pound BLM. Have students estimate the weight of each object as weighing about 1 pound, more than 1 pound, or less than 1 pound and record their estimates on the chart. Have students check their estimates using the pan balance by placing the 1-pound object on one side of the pan balance and the object being measured on the other side of the balance. Students will record whether the object’s actual weight is about 1 pound, more than 1 pound, or less than 1 pound on the chart.

After using a pan balance to estimate measurements, demonstrate how to measure the same objects using a mechanical kitchen or bathroom scale to determine the weight in pounds. Call on students to place an object on the scale. If you have a document camera, such as an Elmo or...
Flexcam, use it to project the scale reading so that all students can see it easily. Have the students fill in the weight to the closest pound on their BLM.

**Activity 11: Kilograms (GLEs: 14, 17; W.2.8)**

Materials List: brown paper bags, objects to weigh, 1-kilogram objects (a textbook or dictionary), pan balance, three 1-pound items (such as bags of coffee or loaves of bread), math learning logs

The purpose of this activity is to identify the approximate weight of a kilogram. Students are not expected to convert pounds and kilograms at this time, but should have an understanding of how the two units compare.

Write the word *kilogram* on the board. Tell students a kilogram is used to weigh heavy things in the Metric System. Pass around an object that weighs about 1 kilogram. Ask students to tell whether they think it weighs more than, less than, or about one pound. Place the object on the pan balance and add a 1-pound item to the other side of the balance. Have students explain why the balance did not move (the object is heavier than one pound). Add another pound item to the balance and ask students describe what happened. (The balance didn’t move because the object is heavier than two pounds.) Repeat again, adding another pound. Have students describe what happened this time. (The pound side went down because the object is lighter than 3 pounds.) Students should conclude that a kilogram is between 2 and 3 pounds. Tell students that a kilogram is a little more than 2 pounds.

Place students into groups of 4. Have students search the classroom for things to weigh. They should find something they think weighs less than a kilogram (i.e., box of crayons), more than a kilogram (i.e., basket of books), and something that weighs about 1 kilogram (i.e., box of linking cubes.) Have students compare their objects to the kilogram object using the pan balance. After confirming their predictions, group the objects into 3 groups (more than 1 kilogram, less than 1 kilogram, and about 1 kilogram).

Have students use their math *learning logs* ([view literacy strategy descriptions](#)) to respond to the following questions: How is a see-saw like a pan balance? How do you use a pan balance to weigh an object? Allow students to compare their responses with partners. Have students revisit the “Which Unit and Which Tool?” BLM (started in Activity 9) and fill in the information about measuring weight/mass.

**Activity 12: Finding Capacity (GLEs: 14, 17; W.2.2)**

Materials List: sets of 5 containers for each group (groups should have identical sets), a one-quart container, fillers (such as rice, beans, or bird seed), one-cup measuring cup, catch basin (such as shallow dish or shoe box top), sticky notes, math learning log
Explain that capacity is the amount a container will hold when it is full. Have students name objects that can hold liquid (e.g., teapot, mug, watering can, and barrel).

Display several containers of different sizes (e.g., cup, jar, bowl, milk carton, and jug) and ask students to tell which they think will hold more. Show students a measuring cup and explain that a standard scoop is called a cup. A cup is used to measure small amounts of liquid. Put students into groups. Give each group a set of 5 containers, 10 sticky-notes, a one-cup measuring cup, a catch basin, and filler. Have students estimate how many cups each container will hold, write the estimates on sticky-notes, and place the sticky-notes on the containers. Have the students arrange the containers in order from smallest capacity to largest capacity. Allow groups to share why they arranged the containers in that order.

After arranging the containers, have the students use the measuring cup to fill each container with a filler (such as rice, beans, or bird seed) and record the number of cups needed on the remaining sticky-notes. Have students place the sticky-note on the container that was measured. After measuring all of the containers, have students compare their estimates to the actual measurements and rearrange the containers according to measured capacity, if necessary. Allow students to share their results, checking to see if each group now has the containers in the correct order from smallest capacity to largest capacity.

In their math learning logs (view literacy strategy descriptions), have students explain why some shorter containers had a larger capacity than some of the taller containers. Students should indicate that height of the container does not determine its capacity. Some containers were shorter, but held more because they were longer or wider than the taller containers.

**Activity 13: Cups, Quarts, and Liters (GLEs: 14, 17, 20; CCSS: W.2.8, L.2.4c)**

Materials List: 1-cup measuring cup, quart container, liter container, large bag of rice, 10 or more containers of various sizes (e.g., plastic cup, bucket, pitcher, teapot); Cups, Quarts, and Liters BLM, large bin of water (or access to a sink or fountain), math learning log

Review the definition of capacity. Show students a 1-cup measuring cup, a quart container, and a liter container. Ask students to tell how many cups they think the quart container will hold. Select a student to use the cup to fill the quart container with rice, counting the number of cups as they are poured. Write the word **quart** on the board. Ask students to identify another word that they know that is similar to the word quart (quarter). Discuss the meaning of the words quart and quarter. (There are 4 quarters in a dollar, a quarter of an hour is ¼ of an hour, 4 cups is equal to 1 quart.) Next, label the containers as 1 cup and 1 quart. Explain that the cup and quart are U.S. customary units of measure, but the metric system uses a base unit of liters. Display the liter container and have students identify that a liter is about the same size as a quart. Label this container as 1 liter.

To avoid cleaning up large spills, this part of the activity should be conducted outdoors. Provide large and small containers labeled with a letter from A – Z for students to measure the amount of water each container will hold. Place the students into groups of 3 or 4 and allow them to select a
container and use measuring cups, quart containers, and liter containers to fill each container, recording the measurements on the Cups, Quarts, and Liters BLM. Be sure that measurement containers are clearly labeled as cups, quarts, or liters so that students can record the measurements correctly.

In their math learning logs (view literacy strategy descriptions), have students compare the size of a cup and a quart and describe how to use them for measuring. Students should explain that a cup is smaller than a quart, a quart is the same as four cups, and that cups can be used to measure how much a small container will hold while a quart can be used to measure how much a larger container will hold. Allow students to share their writings with partners. Also, have students complete the capacity section of the “Which Unit and Which Tool?” BLM that was glued into their learning logs from Activity 9.

**Activity 14: Perimeter (GLES: 9, 14; CCSS: L.2.4c)**

Materials List: Inch Rulers (from Activity 1), objects to measure perimeter, paper, pencil, calculator, Measuring Perimeter BLM

Discuss and explain that perimeter is the distance around the outside edge of a shape. Tell them to look for the word “rim” inside the word “perimeter” as a reminder that rim means edge, and perimeter is the measure of the outside edge of a shape. Ask students to name things in the classroom that would have a perimeter (e.g., the faces of windows, chalkboard, bookcases, and doors).

Challenge students to think of a way to measure the perimeter of the face of a door, and have them try some of the ways suggested, discussing which units of measure work best. Have students come up and lay their rulers end-to-end to find the width of the door. Assist students in finding the height of the door. Ask students if they need to measure all four sides. (No, because the face of the door is a rectangle, opposite sides must be the same length.) Label the face of the door’s edges with the measurements, and have students add to find the perimeter. Draw a shape on the board and model how to measure, record the length of each side, and add all of the side lengths to find the perimeter. Draw several new shapes, selecting students to come up to measure the sides and find the perimeter.

Display a collection of objects for which the students can find the perimeter (e.g., poster board, book, face of a computer monitor, index card, and piece of construction paper). Remind students that they are to find the perimeter of one of the faces of the object. Pair students with partners. Give each student a Measuring Perimeter BLM and his/her Inch Rulers. Have the partners select an object, write the name of the object, and use a 12-inch ruler to find the length of the sides to the nearest inch for the object. The students should add the sides to find the perimeter and record the perimeter on their BLM. Discuss students’ findings after all groups have measured at least 5 objects.

Have students revisit the “Which Unit and Which Tool?” BLM (started in Activity 9) and add perimeter to the chart.
Activity 15: Cover Up (GLE: 18)

Materials List: plain paper, pencil, popped popcorn, index cards, circular counter, color tiles, Cover Up BLM

Hand out the Cover Up BLM. Have students answer questions 1 and 2. Next, have each student draw the outline of his/her hand on a piece of plain paper, and then cover the inside of the outline with popped popcorn. Ask, “How many pieces did you use?” Compare results. Have students record the actual number on their BLM. Students might conclude that they used different amounts due to the different sizes of the drawings.

Give each student an index card. Have students answer questions 3 and 4. Next, cover the rectangle with popcorn. Ask, “Did everyone use the same number of pieces of popcorn?” (No) “Did you cover the rectangle completely?” (No) Make the connection that this time the shapes were the same, but the amount of popcorn was not the same.

Distribute the circular counters to each student. Have students answer questions 5 and 6 and then cover the index card with the circular counters. The students should compare the results with their team and discuss any differences. Review the answers to questions 5 and 6 after students have covered the index card.

Give each student some square color tiles and have them estimate the number of tiles they will need to cover the index card. Have the students answer questions 7 and 8. After covering the card, have the students compare answers again with their team. Ask, “How many tiles did you use?” (15) “How many tiles did the other students use?” (15) Discuss why everyone used the same amount of tiles to cover the card.

In their math learning logs, have students write to explain the following question: Which unit covered the rectangle best? Students should explain that the square tiles worked best because they were easy to line up evenly and fit the shape of the entire rectangle.

Activity 16: Rectangles Under Cover (GLE: 18; CCSS: 2.OA.4)

Materials List: Rectangular Area BLM, color tiles, math learning logs

Discuss with the students that the number of square units needed to cover a shape is its area. The area is measured in square units. Square color tiles can be used to find the area of a rectangle. Give each student a Rectangular Area BLM. Have students estimate how many tiles it will take to cover each rectangle and record their estimates. Pair students with partners and have them share and discuss their estimates. Have the partners work together to cover the first rectangle. Ask students to tell how many rows of tiles were used and how many tiles are in each row. Have students write a repeated addition number sentence to represent the number of tiles that it took to cover the card and add or skip count to find the total. Students may write 3 + 3 + 3 + 3 + 3 = 15 or 5 + 5 + 5 = 15. Discuss students’ results and allow students to adjust their estimates before covering the next rectangle. Have students continue to cover the remaining rectangles, write a
repeated addition equation, and discuss their estimates and results with their partner. After the students have measured each of the rectangles, have them discuss and compare their results with the class.

In their math learning logs (view literacy strategy descriptions), have students draw a rectangle (The rectangle should be large enough to use color tiles to cover it). Have students write how many color tiles they think it will take to cover their rectangle and explain why they have chosen that estimate. After students have written their explanations, have them cover the rectangle using color tiles and write the repeated addition equation. After measuring, have the students write to evaluate the accuracy of their estimates. Allow students to share their learning log entries with the class.

Activity 17: Professors Know-it-All (GLEs: 14, 17; CCSS: SL.2.1-a-e, SL.2.4)

Materials List: objects to measure, measurement tools (ruler, yardstick, measuring tape, cups, quarts, liters, and scales), index cards, pencil, math learning logs

Allow students a few minutes to review their math learning log’s (view literacy strategy descriptions) notes about measurement.

Display a table of objects that can be measured in various ways (length, perimeter, capacity, weight/mass) and a variety of measurement tools (rulers, yardsticks, measuring tapes, scales, measuring cups, quart and liter containers). Divide the class into groups of four. Have each group select an object from the table and have them discuss ways that the object can be measured. Provide each group with 4 index cards. Have students write four measurement questions about the objects on index cards.

Sample questions might include:

- How tall is the plastic cup?
- How much water will it hold?
- Which tool would you use to measure the capacity of this cup?
- Which unit would you use to measure the length of this stick?
- What is the perimeter of this book?
- How much longer is the length of the book than the width?

Announce, “It’s time for Professor Know-It-All!” (view literacy strategy descriptions). Select a group to be the Professors. Have the Professors stand in the front of the room, shoulder to shoulder. Have them call on the other groups to read one of their questions about the object that was chosen. The Professors will huddle to discuss how to answer the question, performing the measurements as needed. One student from the group will be selected to state the answer to the question. The class should consider the answer given and ask for elaboration or correction if needed. After each student in the group has had an opportunity to be the spokesperson, the class may congratulate them on their success at knowing all about measurement. Choose a new group to come up as professors and continue the questioning process. To add novelty to the activity, provide props or costumes (detective hats, lab coats, crowns, etc.) and award certificates for the Professors!
Sample Assessments

Performance and other types of assessments can be used to ascertain student achievement. Following are some examples.

General Assessments

- **Portfolio:** As the student encounters different units of measure, have him/her find pictures in magazines or online, cut out the pictures and glue them to index cards listing the different attributes that can be measured. For a picture of a toy dump truck, the student could list the length of the truck, the height of the truck, or the number of cups of dirt the bed of the truck could hold.

Activity-Specific Assessments

- **Activities 1, 5, and 6:** Prepare a list of classroom objects for the student to measure. There should be two blanks following the name of each object. Have the student estimate the length of the object in inches, centimeters, or feet; measure the object in the chosen unit; and record the actual measurement. Allow the student to explain his/her estimates and measurements.

- **Activity 9:** Provide pictures of measurement tools. Have the student identify the unit and attributes the tool is used to measure and describe how to use the tool for measuring.

- **Activity 10:** Using a food scale, have the student select items he/she thinks weigh about 1 pound and measure to check. Have the student sort the items into groups of “more than,” “less than,” or “about” one pound.

- **Activities 10 and 11:** Observe each student’s accuracy as he/she chooses an object which has approximately the same weight as another object and as he/she tests the weights using a pan balance.

- **Activity 14 and 16:** Provide the student with several outlined shapes with straight sides. Have the student measure the perimeter of each shape in inches and centimeters. Have the student cover the shape with color tiles and identify how many tiles are used to cover the shape.
Time Frame: Approximately three weeks

Unit Description

In this unit, the concepts of operations will be extended to provide foundations for multiplication. Further understanding of addition and subtraction involving 3-digit numbers will be developed. Foundations for multiplication are developed through the use of repeated addition of objects arranged in rectangular arrays. Place value concepts are used to perform the operations of addition and subtraction using models and drawings.

Student Understandings

Students will arrange objects into rectangular arrays of up to 5 rows and 5 columns and will write equations as repeated addition to find the total number of objects in the arrays. Students will solve 3-digit addition and subtraction problems within 1000 using place value concepts, concrete models, and written representations. Students will use place value concepts and properties of operations to explain why addition and subtraction strategies work. Students will solve problems involving money, using the $ and ¢ symbols appropriately.

Guiding Questions

1. Can students write equations to represent the sum of equal addends (repeated addition) for arrays with up to 5 rows and 5 columns?
2. Can students add and subtract 2-digit and 3-digit numbers in which composing or decomposing of tens and hundreds may be necessary using concrete models, drawings, and place value concepts?
3. Can students explain why addition and subtraction strategies work?
4. Can students describe 3-digit addition and subtraction using a written method?
5. Can students solve word problems involving money?

Unit 8 Grade-Level Expectations (GLEs) and Common Core State Standards (CCSS)

<table>
<thead>
<tr>
<th>GLE #</th>
<th>GLE Text and Benchmarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Model, read, and write place values for numbers through 999 in words, standard, and expanded form (N-1-E)</td>
</tr>
<tr>
<td>Math CCSS</td>
<td></td>
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<td>---</td>
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<tr>
<td><strong>CCSS #</strong></td>
<td><strong>CCSS Text</strong></td>
</tr>
<tr>
<td><strong>Operations and Algebraic Thinking</strong></td>
<td></td>
</tr>
<tr>
<td>2.OA.4</td>
<td>Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.</td>
</tr>
<tr>
<td><strong>Number and Operations in Base Ten</strong></td>
<td></td>
</tr>
<tr>
<td>2.NBT.7</td>
<td>Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.</td>
</tr>
<tr>
<td>2.NBT.8</td>
<td>Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.</td>
</tr>
<tr>
<td>2.NBT.9</td>
<td>Explain why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)</td>
</tr>
<tr>
<td><strong>Measurement and Data</strong></td>
<td></td>
</tr>
<tr>
<td>2.MD.8</td>
<td>Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ (dollars) and ¢ (cents) symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?</td>
</tr>
<tr>
<td><strong>ELA CCSS</strong></td>
<td></td>
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<tr>
<td><strong>CCSS #</strong></td>
<td><strong>CCSS Text</strong></td>
</tr>
<tr>
<td><strong>Writing Standards</strong></td>
<td></td>
</tr>
<tr>
<td>W.2.2</td>
<td>Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.</td>
</tr>
<tr>
<td>W.2.8</td>
<td>Recall information from experiences or gather information from provided sources to answer a question.</td>
</tr>
<tr>
<td><strong>Speaking and Listening Standards</strong></td>
<td></td>
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</tbody>
</table>
| SL.2.1 | Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.  
   a. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).  
   b. Build on others' talk in conversations by linking their comments to the remarks of others.  
   c. Ask for clarification and further explanation as needed about the topics and texts under discussion. |
Sample Activities

Activity 1: Adding Tens and Hundreds (GLE: 1; CCSS: 2.NBT.7, 2.NBT.8)

Materials List: Hundreds Ladder BLM, Add Tens and Hundreds Spinner BLM, 3 number cubes per group, paper clip, pencil, base-10 blocks, color tiles or tokens

Provide each student with a Hundreds Ladder BLM, 10 base-ten flats, and a color tile (or a small token to use as a board game piece). Pair the students and give each pair a paper clip, a pencil, and number cube. Have each student place his/her color tile below the 100 space of his/her Hundreds Ladder BLM. Taking turns with a partner, each student will roll the number cube. According to the number rolled, the student will add base-10 flats and will move his/her color tile to the correct space on his/her hundreds ladder. Have the students count on orally as they add or the flats and move their color tiles. If students spin a number larger than they are able to move, they will lose a turn and play will continue with the next partner. Play will continue until one player has reached the 1000 space on the ladder.

Review adding tens to a number. Display the problem 146 + 40. Call two volunteers to show the numbers using base-10 blocks. Have the students combine the sets as the class counts on by tens (146, 156, 166, 176, 186). Discuss that as tens are added, the tens place changes. Ask students to predict what would happen if 2 more tens were added. (There would be 10 tens and they would need to compose a new hundred, so the tens and hundreds place will change). Count on two more tens orally with the class (196, 206).

Move students into groups of 4. Provide each group three number cubes, an Add Tens and Hundreds Spinner, a paper clip and pencil, and 10 each of the base-10 flats, rods, and units. Student 1 will roll the three number cubes and arrange them to create a 3-digit number. Student 2 will show the number using the base-10 blocks. Student 3 will spin the spinners on the Add Tens and Hundreds Spinner BLM. The first spinner will indicate whether tens or hundreds should be added, the second spinner will indicate how many tens or hundreds to add. Student 4 will add rods or flats while the group counts on by tens or hundreds. When adding tens, Student 4 may need to trade 10 tens to compose a new hundred. If the situation occurs where more than 10 hundreds are needed, Student 3 will spin the spinner again to find a new number to add. Repeat three more times, allowing each student a chance to perform each role. After the first complete round, have the students discuss the pattern that they noticed as they added tens or hundreds (when adding tens, the ones place stayed the same, the tens place changed, and the hundreds place changed only when there were 10 or more tens; when adding hundreds the number of hundreds changed, while the tens and ones places stayed the same). Have the students complete another round of the activity, this time mentally adding the tens or hundreds before Student 4 adds or removes the base-10 blocks from the pile. Have Student 4 add the rods or flats as the group counts on to verify their mental calculations.

Display these examples on the board and have students record and solve them in their math learning logs (view literacy strategy descriptions). Have students write a description of how a
number changes when tens or hundreds are added. Allow students to compare their answers and descriptions with a partner and then with the class to verify their thinking.

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>145</td>
<td>300</td>
<td>40</td>
<td>639 + 30</td>
<td>200 + 450</td>
</tr>
<tr>
<td>50</td>
<td>543</td>
<td>724</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Activity 2: Addition with Base-10 (GLE: 1; CCSS: 2.NBT.7, 2.NBT.9)

Materials List: base-10 blocks, Place Value Mat BLM (printed on legal-sized paper), math learning logs

Write the following problem on the board: 184 + 5. Provide base-ten blocks and a Place Value Mat BLM for each pair of students to show the addition problem. Tell students that 184 is the same as 1 hundred + 8 tens + 4 ones. Have students model 184 on the place value mat using 1 flat, 8 rods, and 4 units. Have the students tell which place value is represented by the 5 (the ones place). Ask which base-10 blocks they would use to represent the 5 (units). Have students place 5 units on the mat in the ones column. Discuss that when adding numbers with 3 digits, it is necessary to add hundreds to hundreds, tens to tens, and ones to ones. Model how to write the problem vertically to show that the 5 units are placed in the ones column:

\[
\begin{align*}
184 \\
+\ 5 \\
189
\end{align*}
\]

Since there are only ones to add to ones, have students add 5 ones to 4 ones to get 9 ones. There are still 1 hundred and 8 tens; therefore, the total is 1 hundred + 8 tens + 9 ones or 189.

Repeat this activity with the following problem: 30 + 367. Ask students to notice how this problem is different from the previous problem (the smaller number comes first; the smaller number has no ones, the smaller number has some tens). Remind students that when adding, the numbers can be added in any order, but they must add hundred to hundreds, tens to tens, and ones to ones. Have students use base-10 blocks to add the two numbers. Ask students to tell which digit changed when adding the 3 rods. (the tens digit) Have students use one of their strategies (adding partial sums left to right or right to left, or drawing the model they created with base-10 blocks), but also model how to write the problem vertically:

\[
\begin{align*}
30 \\
+\ 367 \\
397
\end{align*}
\]

Lead a discussion on the fact that since this addition problem does not require composing a new unit, it is easy find the sum by just adding numbers in the same place values. Ask students why they might want to examine the problem first before starting to use a specific strategy (adding the numbers in each place value is faster than drawing pictures or finding sums for each place value.)
Have students use the base-10 blocks to find the sums for the following problems:

\[
\begin{align*}
17 + 152 &= 169 \\
200 + 5 &= 205 \\
303 + 206 &= 509 \\
703 + 7 &= 710 \\
122 + 240 &= 362 \\
+ 131 &= 263 \\
+ 15 &= 165
\end{align*}
\]

In their math learning logs (view literacy strategy descriptions), have students record one of the problems above, draw a representation of how they solved the problem using the base-10 blocks, and explain how they found the sum. The students should explain that when adding 3-digit numbers, ones are added to ones, tens to tens, and hundreds to hundreds. Allow students to share their explanations with the class.

**Activity 3: Place Value Addition (GLE: 1; CCSS: 2.NBT.7, 2.NBT.9, W.2.2)**

Materials List: Place Value Cards BLM, Expanded Form Mat BLM, zip-top bags, math learning logs

Prior to the lesson, copy and cut apart a set of the Place Value Cards BLM for each student. Store each set in a zip-top bag. These cards can be used to represent the expanded form of a number as well as the standard form. To show the standard form, the arrow ends of the cards should be aligned evenly together.

Display the number 435 in expanded form using the place value cards for 400, 30, and 5. Show students how to lay the 5 over the zero on the 30 card, and then lay both cards to cover the zeros on the 400 card, representing the standard form of 435. Give each student a set of place value cards and ask them to find the cards to show the following numbers: 632, 507, 35, and 460.

Write the following problem on the board. 254 + 321. Place the students in pairs. Have each pair work together to show the expanded form of the two addends using the place value cards and the Expanded Form Mat BLM. Have students work together to find the sum of the addends using the place value cards as follows:

<table>
<thead>
<tr>
<th>Expanded Form</th>
<th>Standard Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>50</td>
</tr>
<tr>
<td>300</td>
<td>20</td>
</tr>
<tr>
<td>+</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>70</td>
</tr>
</tbody>
</table>

\[
\begin{align*}
254 + 321 &= 575 \\
+ 321 &= 575
\end{align*}
\]

After students have found the sum, have them move the cards to the standard form to show the addends and sum in standard form. Ask students to explain how these cards show the importance of adding hundreds to hundreds, tens to tens, and ones to ones.
Repeat this process using two or three more problems that do not require composing a new ten and then model the problem $387 + 465$ showing how to compose a new ten using the cards. Ask questions to guide the students to think through and discuss each step of the process and link the process to the standard algorithm.

Step 1: Add the ones. There is not a card for 12, so the students will need a 10 card and a 2 card.

![Card representation of 300 + 80 + 7 + 400 + 60 + 5]

Ask the students, “What should you do to avoid having two digits in the ones place?” Students may suggest moving the 10 card to the bottom of the tens place. If they do this, ask, “Would it be OK to put the 10 at the top of the other tens? What would be a reason for placing the 10 at the top of the tens column?” (It is OK because tens have to be added to tens. If you put the 10 at the bottom, under the line, it will be in the way when you add the other tens.)

Step 2: Move the 10 card into the tens column to add all of the tens. There is not a card for 150, so the students will need a 100 card and a 50 card.

![Card representation of 100 + 300 + 80 + 7 + 400 + 60 + 5 + 150 + 2]

Ask the students, “What should we do to avoid having two digits in the tens place?” Students may suggest placing the 100 card at the top of the hundreds since the 10 card was placed at the top. If students suggest placing it at the bottom of the hundreds column, ask, “Would it be OK to put the 100 at the top of the other hundreds? What would be a reason for placing the 100 at the top of the hundreds column?” (It is OK because hundreds have to be added to hundreds. If you put the 100 at the bottom, under the line, it will be in the way when we add the other hundreds.)
Step 3: Move the 100 card into the hundreds column to add all of the hundreds.

\[
\begin{array}{c}
100 \\
300 \\
400 \\
+ \\
800
\end{array}
\quad \begin{array}{c}
10 \\
80 \\
60 \\
\phantom{+}
50 \\
\phantom{+}2
\end{array}
\]

After students have found the sum, have them move the cards to the standard form to show the sum in standard form.

\[
\begin{array}{c}
100 \\
300 \\
400 \\
+ \\
852
\end{array}
\]

To assist students who aren’t sure about moving the new ten or hundred above the other tens or hundreds, have them work the problem using left to right partial sums or by placing the newly composed value at the bottom. This will help validate the process for those who are unsure that they will get the same answer.

\[
\begin{align*}
387 & \quad +465 \\
+ & \quad \phantom{+} \quad \phantom{+} \\
700 & \quad \quad \phantom{+} \quad \phantom{+}
\end{align*}
\]

Have students use base-10 blocks to explore adding 3-digit numbers with 1-digit, 2-digit and 3-digit numbers, composing tens and/or hundreds as needed. Give each pair of students a pre-cut set of the Place Value Cards BLM and an Expanded Form Mat BLM. Have the students sort the hundreds, tens, and ones cards and place them face down on their desks. Have one student select one card from each place value to create a 3-digit number and show the number using base-ten blocks. Have the partner select a hundreds card, tens card, and/or ones card to create a 1-digit, 2-digit...
digit or 3-digit number and show it with the base-ten blocks. Have the students work together to find the sum of the blocks, composing a new ten or hundred as needed. Have the students use the cards to show the addition process. Repeat the activity several times, alternating roles between partners to allow students to see the similarities in using base-ten blocks and the place value cards in expanded form.

In their math learning logs (view literacy strategy descriptions), have the students write an explanation for the following question: “How is adding with base-10 blocks similar to using the place value cards in expanded form?” After students have completed their entries, allow volunteers to share and discuss their explanations with the class. After the discussion, allow a few more minutes for students to add to or revise their written responses to provide a more complete and accurate explanation.

**Activity 4: Adding 3-digit Numbers (CCSS: 2.NBT.7, 2.NBT.9, W.2.2, W.2.8)**

Materials List: math learning logs, base-10 blocks, Place Value Spinner BLM, large paperclip, pencil, Addition Recording Sheet BLM

Present a SPAWN writing (view literacy strategy descriptions) prompt to students that asks them to apply what they know about place value and adding two digit numbers to a problem with 3-digit addition that requires composing of a new hundred. SPAWN prompts foster students’ writing in the content areas. SPAWN is an acronym for the following five types of writing: Special Powers, Problem Solving, Alternative Viewpoints, What If?, and Next. These prompts can provide frequent opportunities for students to write in math and other content areas, allowing them to record their predictions, reflections, and critical thinking ideas about the topic of study. Prompts that ask students to make predictions about the lesson should be presented before the lesson is taught; reflective prompts should be presented after students have learned the new information.

Have students copy the prompt in their math learning logs (view literacy strategy descriptions) and allow approximately 10 minutes for students to think and write their response.

Sample SPAWN Prompt:

P- Problem Solving
You won 367 tickets and your friend won 251 tickets at the arcade. You want to put your tickets together so that you can turn them in for a bigger prize. How would you use what you know about addition and place value to find how many tickets you had altogether?

After students have completed their responses, allow volunteers to share their ideas with the class. The other students will listen for logic and accuracy. Guide the class to the conclusion that a new hundred can be composed from 10 of the tens and this 1 hundred can be added to the amount in the hundreds place. Allow students to explore the addition problem using the base-10 blocks. Students may revisit their SPAWN response to add to or revise their ideas.
Model adding the numbers vertically by adding ones to ones, tens to tens, and hundreds to hundreds, recording the sums for each place value and then the total sum.

\[
\begin{array}{ccc}
367 & + 251 & 367 \\
\hline
\quad & 8 & 8 \\
\quad & 110 & 110 \\
\quad & 500 & + 500 \\
\quad & 618 & \\
\end{array}
\]

Discuss with students that there is a standard way that many people record their work when they add larger numbers. Model the problem using base-10 drawings and connecting it with the standard algorithm:

Step 1:

\[
\begin{array}{ccc}
367 \\
\hline
\quad & + 251 & 8 \\
\end{array}
\]

Step 2:

\[
\begin{array}{ccc}
100 \\
\hline
1 \\
\end{array}
\]

Step 3:

\[
\begin{array}{ccc}
100 \\
\hline
\quad & + 251 & 618 \\
\end{array}
\]

Place students in pairs. Using the Place Value Spinner BLM and the Addition Recording Sheet, Partner A will spin each spinner to get a 3-digit number and record it in the first row of the first problem. Partner B will spin each spinner to get a 3-digit number and write it below Partner A’s number in the first problem. Partner A will show the two numbers using base-10 blocks and join them together in one group as Partner B draws an illustration of the base-10 blocks in the space next to the problem. Partner A will count the base-10 blocks and compose a new ten or hundred
if needed. Partner B will illustrate the process by circling new groups of ten or one hundred and recording the addition numerically. Have the students switch roles to work the remaining problems.

Activity 5: Baby Kangaroo’s Money (CCSS: 2.NBT.7, 2.MD.8, W.2.2, SL.2.1a-c)

Materials List: Baby Kangaroo BLM, School Supply Shopping List

Have each student create a RAFT writing (view literacy strategy descriptions) assignment. RAFT writing allows students to apply and extend new learning in creative ways. Students project themselves into unique roles to explain processes or solve a problem. RAFT stands for the following:

- **R** – Role (role of the writer)
- **A** – Audience (to whom or what the RAFT is being written)
- **F** – Form (the form the writing will take, as in letter, song, etc.)
- **T** – Topic (the subject focus of the writing)

The RAFT acronym should be presented and explained to the students. It is important to review the acronym each time RAFT writing is implemented so that students will recall the procedure. You may wish to post a chart with the acronym for easy reference.

Display and read the following rhyme to with students:

**The Baby Kangaroo**

"My baby is a bright one,"
said the mother kangaroo.
"With money in my pocket,
he knows just what to do."

He counts the nickels all by fives.
The dimes he counts by ten.
And if they drop, he quickly
picks them up and counts again.

Each time I give my son a coin
he always hollers, "Thanks!"
And when he's got a lot of them,
He puts them in his bank!

Distribute The Baby Kangaroo BLM and assign the following RAFT for the students to complete. Tell the students that they will take the role of the baby kangaroo and write a math story or a rhyme. The baby kangaroo has 10 coins in his pocket. He is getting ready for 3rd grade and needs to go school supply shopping. The students will write a math story or rhyme telling
which coins the baby kangaroo has in his pocket and how much money he has in all. Display or
distribute the School Supply Shopping List BLM. They will select 3 items from the school
supply shopping list for the baby kangaroo to purchase. They should total the 3 items and tell
how much money the baby kangaroo will have left to put into the bank.

R – Baby Kangaroo
A – Store Clerk
F – Math Story or Rhyme
T – the total price for items they are purchasing

Below is an example of what a student RAFT writing might look like. Use this example to model
how to complete the RAFT.

I am a baby kangaroo. I have 10 coins in my pocket. Here is how much money I have:

25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 10¢ 10¢ 10¢ 5¢ 1¢

My total money is $1 and 86¢ or $1.86.

I am getting ready for 3rd grade and I need new school supplies.
I want to buy a pencil for 25¢, a notebook for 49¢, and scissors for 67¢. I will spend
141¢, or $1.41. I will have 45¢ to put in the bank!

After students have written their RAFTs, have them share their RAFTs with partners. The partner
will listen carefully to the RAFT to check for logic and accuracy. After students share their
RAFTs with the class, have students re-copy their edited RAFTs and illustrate them on unlined
paper. After all problems are re-copied, combine them together to create a class book. The
students can use the book to role-play as baby kangaroo and a store clerk to practice counting out
the coins needed to make the school supply purchases.

Activity 6: Decomposing Tens and Hundreds (CCSS: 2.NBT.7, 2.NBT.8, W.2.2, SL.2.1a-b)

Materials List: base-10 rods and flats, Tens and Hundreds Spinner BLM, paper clips, number
cubes, pencil, paper, math learning logs

Using the directed learning-thinking activity (DL-TA) (view literacy strategy descriptions), guide
students to determine how to decompose, or break apart, tens and hundreds when subtracting.
DL-TA allows students to make and check predictions as they are learning. Students learn to self-
monitor as they are reading and learning new information. Students’ attention, comprehension,
and achievement increase as they become motivated to find out if their predictions are correct.
Show the students a base-ten flat and ask them how much it represents. Record the number 100
on the board. Tell the students that they must take away 20 from the flat. Ask them to predict
what might be done to complete the subtraction process. Have the students turn and talk to a
partner to discuss what they think could be done to take away 20. Students should write the
following question in their math learning logs (view literacy strategy descriptions) and record their predictions.

How can 20 be taken away from 100 using base-10 blocks?

Allow students to share their suggestions and try them out using the flats and rods. As students test their predictions, they should make adjustments until they have discovered that the flat will need to be broken apart, or decomposed. This can be done by exchanging the flat for ten rods. Ask a student to demonstrate this process.

Continue the DL-TA with more examples of subtracting tens and hundreds that do and do not require decomposing hundreds into tens (e.g. 120 – 70, 180 – 40, 330 – 150). The students should write the question and their predictions for each problem in their learning logs and then explore their predictions using the base-10 blocks. Continue to allow students to share and discuss their predictions, revising them when necessary. Students should be encouraged to use DL-TA frequently as they read or explore new content.

Divide the class into groups of four. Provide the groups with nine flats, ten rods, a Tens and Hundreds Spinner BLM, a paper clip, and a number cube. Team members will place all of the flats in the center of the group. The first member will spin the Tens and Hundreds Spinner to determine whether they should subtract tens or hundreds. The second member will roll the number cube to determine how much to subtract. The third member will remove flats or rods to show the difference. If needed, the student will trade a flat for ten rods to subtract tens. The fourth member will write a number sentence on a piece of paper to represent the subtraction problem. Students will change roles by passing the materials clockwise. If students roll a number that requires subtracting more than the number of flats or rods available, the group will call out “Bust!” and pass to the next round of play. Continue for a set amount of time or until one team has reached 0. If the group rolls 4 “busts” in a row, the game ends and the students may start over with 9 flats.

Example:
The students have 9 flats. Student #1 spins hundreds. Student #2 rolls a 2. Student #3 takes away two flats. Student #4 records the number sentence 900 – 200 = 700. Each student passes his/her materials clockwise in the group so that they each have a new role. Student #2 spins tens. Student #3 rolls a 4. Student #4 exchanges a flat for ten rods, and takes away 4 of them. Student #1 counts the rods and units and records the number sentence 700 – 40 = 660.

Activity 7: 3-Digit Subtraction (CCSS: 2.NBT.7, 2.NBT.9, W.2.2, W.2.8, SL.2.1a-c)

Materials List: math learning logs, base-10 blocks, Place-Value Mat BLM (printed on legal-sized paper)
Write the following subtraction problem on the board.

\[
\begin{array}{c c c}
3 & 3 & 8 \\
- & 1 & 5 & 4 \\
\end{array}
\]
Using the directed thinking-learning activity (DL-TA) (view literacy strategy descriptions), have students record the problem and write predictions in their math learning logs (view literacy strategy descriptions) to tell how they think the problem can be solved using what they already know about place value and decomposing numbers. Allow students to share their ideas with the class.

Provide students with 5 flats, 19 rods, and 19 units. Have students use their base-10 blocks and Place-Value Mat BLM to show 338. Guide the students through the subtraction problem, discussing the subtraction process for each place value position. Have the students record their work using base-10 drawings to show the subtraction steps. After each place is discussed, have students revisit their predictions to revise their ideas as new information is assimilated.

Step 1: Beginning with the ones, students should notice that the ones can be subtracted without decomposing a ten. Have the students place an X on 4 dots in their drawings and record a 4 for the answer in the ones place.

\[
\begin{array}{ccc}
3 & 3 & 8 \\
-1 & 5 & 4 \\
\hline
\end{array}
\]

Step 2: Allow students to record or reconsider their predictions about what will happen in the tens place. Ask students if they can subtract 5 tens from 3 tens. Students should notice that they do not have enough rods to take away 5, but they can decompose, or break apart, a flat to get ten more rods. Have the students exchange a flat for 10 rods and record this in their drawing by slashing out one square and drawing ten more sticks. Tell them that since they have decomposed one of the hundreds for 10 tens, they now only have 2 hundreds. Tell students that some people show this by crossing out the number in the hundreds place and recording the new amount above it. Have students cross out the 3 in the hundreds place and write a two above it. Ask the students to tell how many rods they now have in the tens place and if there are enough to subtract 5 rods. They should see that they now have 13 rods in the tens place. Tell students that this can be shown by crossing out the number in the tens place and writing the new amount of tens above it. Have the students cross out the 3 in the tens place and write 13 above it. Have the students remove 5 rods, place an X on 5 sticks in their drawings, and record the number 8 in the tens place.

\[
\begin{array}{ccc}
2 & 13 & 8 \\
-1 & 5 & 4 \\
\hline
8 & 4
\end{array}
\]

Step 3: Before exploring the hundreds, allow students another opportunity to record or revise their predictions for the hundreds place. Students should recognize that 1 flat can be taken away from the two remaining flats, resulting in one flat left. Have the students place an X on one of the remaining squares and record a 1 in the hundreds place.
Step 4: Ask students how many blocks they have left. Have students count their flats, rods, and units to determine that there are 184 blocks remaining. Therefore, \(338 - 154 = 184\).

If students have difficulty recognizing the need to regroup step by step, review the strategy “decomposing where needed first” that was introduced in Unit 4, Activity 6. This strategy requires all decomposition to be completed before subtracting the digits. By decomposing first, students will be less likely to perform the common error of subtracting a smaller digit on the top from a larger digit on the bottom. Students may then perform the subtraction left to right or right to left.

Repeat the process with the following examples until students are comfortable decomposing hundreds (527 – 51, 609 – 552). Add in problems that require decomposing both hundreds and tens and model this process for students. (723 – 467, 810 – 52, 512 – 127) Students should understand that decomposing tens and hundreds is necessary when there are not enough ones or tens from which to subtract.

Have the students return to their learning logs and write a step-by-step explanation about how to solve the problem. Have students state whether their original predictions were complete or accurate and include more information about decomposing the tens and hundreds. Allow students to share their new ideas with a partner.

**Activity 8: Base-10 Subtraction (CCSS: 2.NBT.7, 2.NBT.9, W.2.2)**

Materials List: dry erase boards, dry erase markers, sock erasers, base-10 blocks, Place Value Mat BLM (printed on legal-sized paper), math learning logs,

Write the following subtraction problem on the board and show a base-10 drawing.

\[
\begin{array}{cc}
4 & 0 \\
- & 3 \\
\hline
\end{array}
\]

Have the students review the ones place and ask what should be done if there are not enough ones to subtract (A ten should be decomposed into 10 ones). Then ask, “But what if there are no tens?” Allow students to share suggestions, leading them to the conclusion that a hundred can be
decomposed into 10 tens and then a ten can be decomposed into ones. Model this concept step by step as in the previous activity using base-10 blocks. If students have difficulty recognizing the need to regroup step by step, review the strategy “decomposing where needed first” that was introduced in Unit 4, Activity 6. This strategy requires all decomposition to be completed before subtracting the digits. By decomposing first, students will be less likely to perform the common error of subtracting a smaller digit on the top from a larger digit on the bottom. Have the students perform the decomposing with their drawings and connect it to the standard algorithm by crossing out the numbers that are decomposed and recording the new amount in each place value. Students may then perform the subtraction left to right or right to left. Have students illustrate the decomposing and subtraction steps on a dry erase board as the process is modeled.

Allow students to work with a partner to find the differences for the following problems. Students should work the problems on a dry erase board and draw the base-10 models. If needed, students may also model the problem using base-10 blocks. Ask volunteers to share and explain their drawings and solutions for each problem.

703    500    602    307    800    600
- 242    - 131    - 415    - 158    - 435    - 256

In their math learning logs (view literacy strategy descriptions), have students record one of the problems and explain the process they used to find the difference. Students may should pictures, numbers, and words for their written explanations. Allow students to share their explanations with the class and to make adjustments for accuracy and completeness as needed.

Activity 9: Subtraction Steps (CCSS: 2.NBT.7, 2.NBT.9, W.2.8)

Materials List: Subtraction Steps BLM, 3 number cubes per team, Subtraction Recording Sheet BLM, pencil

Copy and cut apart the Subtraction Steps BLM for each group of four students. Give a set of cards to teams of four students. Have the students put the cards in the correct order. When a team is finished, the students should raise their hands to have their answers checked. Discuss with each team their reasoning for ordering the steps. Students may organize the steps in various ways, but should be able to explain their reasoning to indicate an understanding of the process of subtracting 3-digit numbers. Guide each team as needed to determine the correct steps for subtracting 3-digit numbers.
Examples of ways to organize the subtraction steps:

All decomposing steps first, right to left.  

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the ones. If there are not enough ones to subtract, decompose a ten into 10 ones.</td>
</tr>
<tr>
<td>2.</td>
<td>Check the tens. If there are not enough tens to subtract, decompose a hundred into 10 tens.</td>
</tr>
<tr>
<td>3.</td>
<td>Subtract the ones and record the difference in the ones column.</td>
</tr>
<tr>
<td>4.</td>
<td>Subtract the tens and record the difference in the tens column.</td>
</tr>
<tr>
<td>5.</td>
<td>Subtract the hundreds and record the difference in the hundreds column.</td>
</tr>
</tbody>
</table>

All decomposing steps first, left to right.  

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the tens. If there are not enough tens to subtract, decompose a hundred into 10 tens.</td>
</tr>
<tr>
<td>2.</td>
<td>Check the ones. If there are not enough ones to subtract, decompose a ten into 10 ones.</td>
</tr>
<tr>
<td>3.</td>
<td>Subtract the hundreds and record the difference in the hundreds column.</td>
</tr>
<tr>
<td>4.</td>
<td>Subtract the tens and record the difference in the tens column.</td>
</tr>
<tr>
<td>5.</td>
<td>Subtract the ones and record the difference in the ones column.</td>
</tr>
</tbody>
</table>

Alternate decomposing and subtracting steps from right to left.  

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the ones. If there are not enough ones to subtract, decompose a ten into 10 ones.</td>
</tr>
<tr>
<td>2.</td>
<td>Subtract the ones and record the difference in the ones column.</td>
</tr>
<tr>
<td>3.</td>
<td>Check the tens. If there are not enough tens to subtract, decompose a hundred into 10 tens.</td>
</tr>
<tr>
<td>4.</td>
<td>Subtract the tens and record the difference in the tens column.</td>
</tr>
<tr>
<td>5.</td>
<td>Subtract the hundreds and record the difference in the hundreds column.</td>
</tr>
</tbody>
</table>

Provide each team with 3 number cubes. The first team member will roll the number cubes and write the largest number possible on the first table of the Subtraction Recording Sheet BLM. He/she will draw a base-10 representation of the number in the space next to the table. The second team member will roll the number cubes and write a smaller number below the first number on the table. If a smaller number cannot be written, the second team member should roll until a smaller one can be written. The third team member will determine if any of the digits...
need to be decomposed in order to complete the subtraction, represent the decomposing steps in the illustration, and record the decomposing numerically in the gray area of the table. The fourth team member will complete the subtraction on the illustration and record the difference for the problem on the table. Repeat three more times changing roles so that each student performs each role.

**Activity 10: 3-Digit Word Problems (CCSS: 2.NBT.7)**

Materials List: 3-digit Word Problems BLM, Text Chain Solutions BLM, base-10 blocks, index card, math learning logs

Review the types of problems that students might encounter for adding and subtracting and how to determine whether to add or subtract for each type of problem. Provide each pair of students with a 3-digit Word Problems BLM. Have students work with partners to solve the problems. Partner A will solve the first problem and pass the paper to Partner B. Partner B will check the work for accuracy. Students may use drawings, words, or numerals to solve the problem. If the solution is correct, Partner B may draw a smiley face; if it is incorrect, he/she should return the paper to Partner A and direct him/her to try again by offering a hint. (ex.: You forgot to decompose a ten, you should have added, etc.) When the problem is correct, Partner B may then draw a smiley face. Partner B will work the second problem and allow Partner A to check. Continue alternating between partners to complete the page.

Put students into teams of four and assign each team a name or number (ex.: Team 1, Team 2). Give each team 2 index cards and 10 base-10 flats, rods, and units. On one side of the first index card, the teams will write their team name or number. On the other side the teams will write a text chain (view literacy strategy descriptions) addition or subtraction problem using the 3-digit numbers. Each team will first need to decide if it wants to write an addition or subtraction problem. If writing an addition problem, the total should not exceed 1000. The first two team members will write a statement for the problem. The third team member will write the question. The fourth team member will write the correct answer for the problem on the second index card in a complete sentence. The teams should use the base-10 blocks to check the problems and answers for logic and accuracy.

Sample addition text chain:

```
Mary has a collection of 99 stickers. She got 249 stickers for her birthday. How many stickers does she have now?
```

Sample subtraction text chain:

```
John has 550 baseball cards. He wants to sell 399 cards. How many cards will he have left?
```
Have each team trade problems with another team and solve each problem on the Text Chain Solutions BLM. Trade again until all teams have had an opportunity to solve each team’s problem. Check answers by having each team read its problem and answer statement aloud.

**Activity 11: Building Arrays (CCSS: 2.OA.4; SL.2.1a-c)**

Materials List: photo of an egg carton (or an empty egg carton), muffin pan, zip-top bags, color tiles, Array Spinner BLM, paper clip, pencil, dry erase boards, dry erase markers, sock erasers, index cards, glue, 1-inch construction paper squares

Display a photo of an egg carton (or an empty egg carton). Explain to students that eggs are arranged in a rectangular array. An array is an arrangement of objects in equal rows. Discuss the meaning of the terms rows and columns. Have students tell how many rows are in an egg carton and how many columns are in an egg carton. (The number of columns and rows, however, depends on the way that the egg carton is oriented.) Discuss that arrays make it easy to find the total number of objects because they help organize the objects. Ask students to tell how they could find the total number of eggs (skip count each column by twos, add the number in each row, add the number in each column, etc.). Have a student model each suggestion for the class. Ask students to name other examples of objects that might be organized in arrays (rows of desks, a box of 24 crayons, papers on a bulletin board, a cupcake pan, stars on the flag, square tiles on the floor, baskets lined up on shelves, etc.). If students have trouble thinking of examples, point out examples that they might easily see within the classroom. Ask students to identify the number of rows and the number of columns in each array. Display a muffin pan. Ask students to tell how many rows and columns are on the pan. Model how to write two addition sentences using equal addends to represent the total number of muffins that can be made using the pan:

$$3 + 3 + 3 + 3 = 12 \quad \text{or} \quad 4 + 4 + 4 = 12$$

Distribute the Array Spinner BLM, a paper clip, and pencil; a dry erase board, dry erase marker, and sock eraser; and a bag of 25 color tiles to each set of partners. Partner A will spin the Array Spinner to find the number of rows and columns. Partner B will arrange color tiles according to the number of rows and columns spun. Partner A will write an addition equation to represent the sum of the total number of tiles. Partner B will count the tiles (individually or by skip-counting) to check Partner A’s equation. Students will repeat the activity several times, alternating roles each time for additional practice.

Pass around a bag of construction paper cut into 1 inch squares. Instruct students to take a handful of squares from the bag. On an index card, have the students arrange and glue the squares in a rectangular array. The student may choose not to use all of the squares (e.g. 17 will not make an array, so the student may choose to make a 4 by 4 array using 16 squares). On the back of the card, have each student write a description of his/her array to tell the number of rows and columns, how many squares are in each row and column, and how many squares they used in all. Have each student also write an addition equation to represent the array created.
After students have completed their cards, have the students form an “Inside-Outside Circle” for discussion (view literacy strategy descriptions). Give each student in the outside circle a dry erase board, dry erase marker, and sock eraser. Have each student in the inside circle show his/her partner the array on the index card. The inside partner will read the description of the array without revealing the total number of squares. The outside partner will write a repeated addition equation to find the total number of squares. The inside partner will confirm or provide hints if needed. The partners will trade roles and discuss the array created by the outside partner. After both partners have shared their arrays, have the inside circle rotate to the right until “stop” is called. The students will repeat the discussion with their new partners. Complete 4 rotations to give students the opportunity to discuss a variety of arrays.

Activity 12: Grandma’s Garden (CCSS: 2.OA.4)

Materials List: 10 × 10 Grid BLM, 7 × 7 Grid BLM (optional), crayons or markers

Read the following story to the students: “Grandma wants to create a garden. She wants to plant 4 rows of corn with 3 corn stalks in each row. How many corn stalks will grandma plant?”

Display a 10 × 10 Grid BLM and ask students to tell which way the rows go (across) and how many rows are needed to model the problem (4). Ask students to name the up and down rows (columns) and tell how many columns are needed to model the problem (3). Using a yellow marker, color 4 rows of 3 squares each. Have students discuss how to find the number of corn plants. Students may suggest counting all of the squares, adding the number of corn stalks in each row, adding the number of rows in each column, etc. Model how to count the number of plants in each column and write a repeated addition equation to find the sum of all of the columns. Provide each student a 10 × 10 Grid BLM and have them complete the array as modeled, writing the addition equation to represent the total number of corn plants. Instruct students to help grandma with her garden layout. Ask students to name other vegetables grandma might include in her garden and the colors they could use to represent the fruits or vegetables (carrots = orange, beans = green, eggplant = purple, tomatoes = red, radishes = magenta, blueberries = blue, etc.) Have them divide their grid paper into arrays of up to 5 rows and 5 columns and color each section a different color to represent a different fruit or vegetable. Then have them write the addition equations to show how many of each plant grandma would plant in her garden. Allow students to share their garden pictures with the class. Display the garden pictures on a bulletin board titled “Planning Grandma’s Garden.” For students who have difficulty with the 10 × 10 grid, the 7 × 7 Grid BLM may be used.
Examples:

\[
\begin{array}{c}
7 \times 7 \\
4 + 4 + 4 = 12 \\
\text{corn stalks} \\
3 + 3 + 3 + 3 = 12 \\
\text{tomatoes} \\
3 + 3 = 6 \\
\text{carrots} \\
4 + 4 = 8 \\
\text{peas} \\
3 + 3 + 3 = 9 \\
\text{eggplants} \\
1 + 2 = 2 \\
\text{cucumbers} \\
\end{array}
\]

\[
\begin{array}{c}
10 \times 10 \\
4 + 4 + 4 = 12 \\
\text{corn stalks} \\
3 + 3 + 3 + 3 = 12 \\
\text{tomatoes} \\
3 + 3 + 3 = 9 \\
\text{carrots} \\
2 + 2 + 2 = 6 \\
\text{peas} \\
4 + 4 + 4 = 15 \\
\text{blueberries} \\
2 + 2 + 2 = 6 \\
\text{eggplants} \\
2 + 2 + 2 = 6 \\
\text{cucumbers} \\
\end{array}
\]

Activity 13: Matching Arrays and Repeated Addition (CCSS: 2.OA.4)

Materials List: small stickers or rubber stamps and ink pads, index cards

Provide each student with 2 index cards and a set of stickers (or a rubber stamp and ink pad). On one index card, have students create a rectangular array of up to 5 rows and 5 columns using the stickers or stamps. On the other card, have students write a repeated addition equation to show the total number of stickers/stamps on the card. Allow students to make 3 or 4 sets of cards. Place students into groups of 3 or 4. Have the students place the array cards face down in rows on the left and the equation cards face down in rows to the right. Students will take turns flipping over an array card and an equation card to find a match. If a match is found, the student may keep the cards. If a match is not found, the student will return the cards to the face down position. Play ends when all matches are found.
Sample Assessments

Performance and other types of assessments can be used to ascertain student achievement. Following are some examples.

General Assessments

- Write ten addition and subtraction problems in context using a combination of 1-digit numbers, 2-digit numbers, 3-digit numbers for the student to solve correctly using concepts learned. Have the students solve the problems using base-ten blocks, place value cards, or other learned strategies.

Activity-Specific Assessments

- **Activity 4**: Provide students a blank copy of the Addition Recording Sheet BLM and the Place Value Spinner BLM. Have students spin two 3-digit numbers, record them, and find their sum.

- **Activity 9**: Write the following subtraction sentences on the board. Using the Subtraction Recording Sheet BLM, have students rewrite the problems and complete the subtraction steps to find the difference.

  $$430 - 128 \quad 729 - 452 \quad 478 - 234 \quad 307 - 173$$

- **Activity 12**: Provide students with stamps or stickers and a $7 \times 7$ Grid BLM or $10 \times 10$ Grid BLM. Have the students create various arrays of stamps or stickers on the grid paper and write repeated addition equations to find the total number in each array.