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Georgia Performance Standards Framework for Mathematics – Grade 2

Unit 2 Organizer: “PLACE VALUE, MONEY, AND ESTIMATION” **(6 weeks)**

OVERVIEW:

In this unit students will:

- use a variety of models (base ten blocks, diagrams, and number sentences) to represent numbers up to 100;
- identify the number of items in a given set;
- write numbers in expanded form and standard form using words and numerals;
- identify a digit’s place and value when given a number (example, 567: the six is in the tens’ place and its value is 60);
- connect place value to values of money;
- count with pennies, nickels, dimes, quarters and dollar bills;
- make fair trades using money;
- count back change from a given amount of money; and
- represent a money amount with words or digits.

Children in second grade are usually familiar with numbers to one hundred and can count and write them with a degree of accuracy. They are beginning to understand the place value system. An important item to facilitate this understanding is the relationship between the numbers and groups of hundreds, tens and ones (for example, the number 142 means one group of one hundred, four groups of ten and two ones). As students understand the significance of the positions of digits in numbers, they can explain the meaning of each digit and its value. Having a thorough understanding of place value provides a foundation for operations with numbers. Also, when students know the same number can be represented by different equivalent groupings, they become more flexible with their use of numbers in operations (for example, fifty-three can be represented by five tens and three ones; four tens and thirteen ones; three tens and twenty-three ones; etc.). Taking numbers apart (decomposing) and recombining (composing) them in different ways is a significant skill for computation. Important tools used to develop and extend place value concepts include base ten blocks, tens frames, and hundreds charts.

Second grade standards include making change which is very similar to subtracting by counting on. For example, how far is it from 16 to 75? You could add **4** to 16 to make 20 then add **50** to get to 70 and finally **5** more to make the total of 75. The total added to 16 to make 75 is **59**. This process of adding on or subtracting from 75 helps you find the difference needed to make change. The coins associated

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with this thinking would be 4 pennies, 2 quarters, and 1 nickel. Helping students understand the concept of ‘adding on’ lays the groundwork for counting back change.

To assure that this unit is taught with the appropriate emphasis, depth, and rigor, it is important that the tasks listed under “Evidence of Learning” be reviewed early in the planning process. A variety of resources should be utilized to supplement, but not completely replace, the textbook. Textbooks not only provide much needed content information, but excellent learning activities as well. The tasks in these units illustrate the types of learning activities that should be utilized from a variety of sources.

ENDURING UNDERSTANDINGS:

- A number has meaning based upon the place values of its digits.
- Numbers may be represented in a variety of ways.
- Money may be exchanged for items of equal value.
- Counting money can help to make sure that the correct amount of change has been given.
- Place value can help to determine which numbers are larger or smaller than other numbers.

ESSENTIAL QUESTIONS:

- Why should I understand place value?
- What are the different ways you can show or make (represent) a number?
- What is the difference between place and value?
- If you have two or more numbers, how do you know which is greater?
- Why is it important to be able to count amounts of money?
- What are the different ways you can represent an amount of money?
- How do you make sure you are given the correct change after you buy something?
- How do you know if you have enough money to buy something?

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STANDARDS ADDRESSED IN THIS UNIT

Mathematical standards are interwoven and should be addressed throughout the year in as many different units and activities as possible in order to emphasize the natural connections that exist among mathematical topics.

KEY STANDARDS:

M2N1. Students will use multiple representations of numbers to connect symbols to quantities.

- Represent numbers using a variety of models, diagrams, and number sentences (e.g. 4703 represented as $4,000 + 700 + 3$, and units, 47 hundreds + 3, or $4,500 + 203$).
- Understand the relative magnitudes of numbers using 10 as a unit, or 1000 as a unit. Represent 2-digit numbers with drawings of tens and ones and 3-digit numbers with drawing of hundreds, tens, and ones.
- Use money as a medium of exchange. Count back change and use decimal notation and the dollar and cent symbols to represent a collection of coins and currency.

RELATED STANDARDS:

M2D1. Students will create simple tables and graphs and interpret their meaning.

- Organize and display data using picture graphs, Venn diagrams, bar graphs, and simple charts/tables to record results.
- Know how to interpret picture graphs, Venn diagrams, and bar graphs.

M2P1. Students will solve problems (using appropriate technology).

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

M2P2. Students will reason and evaluate mathematical arguments.

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

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M2P3. Students will communicate mathematically.

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

M2P4. Students will make connections among mathematical ideas and to other disciplines.

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

M2P5. Students will represent mathematics in multiple ways.

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

CONCEPTS/SKILLS TO MAINTAIN:

It is expected that students will have prior knowledge/experience related to the concepts and skills identified below. It may be necessary to pre-assess in order to determine if time needs to be spent on conceptual activities that help students develop a deeper understanding of these ideas.

- Fluency with single digit addition/subtraction facts to 18
- Fair trades with coins or bills
- Duration and sequence of events
- Number patterns-skip count, odd/even
- Fact families
- Fractions: halves, fourths
- Tally marks
- Picture graphs

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- Estimation: rounding to nearest ten
- Telling time
- Measurement – estimating, comparing, and ordering
- Basic geometric figures and spatial relationships

EVIDENCE OF LEARNING:

By the conclusion of this unit, students should be able to demonstrate the following competencies:

- Use models, diagrams and number sentences to represent numbers less than 10,000 (through 4 digits).
- Write numbers in expanded form-and standard form using words and numerals
- Identify a digit's place and value when given a number less than 10,000 (through 4 digits).
- Connect place value to values of money.
- Count back change from a given amount of money.
- When writing money amounts, use the dollar and cent symbols and decimal notation appropriately.
- Represent money amounts with words or digits.

The following tasks represent the level of depth, rigor, and complexity expected of all second grade students. These tasks or tasks of similar depth and rigor should be used to demonstrate evidence of learning.

- High Roller
- What's My Number?
- Base Ten Pictures
- What I Have and What I Need
- Change and More Change
- Shopping for School Supplies
- Money In My Pocket

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Culminating Activity: “Money In My Pocket”

Students will guess the combination(s) of ten coins that are found in a raincoat pocket. They will be able to choose 3 activities out of 9 possibilities to demonstrate their understanding of money and coins.

STRATEGIES FOR TEACHING AND LEARNING:

- Students should be actively engaged by developing their own understanding.
- Mathematics should be represented in as many ways as possible by using graphs, tables, pictures, symbols, and words.
- Appropriate manipulatives and technology should be used to enhance student learning.
- Students should be given opportunities to revise their work based on teacher feedback, peer feedback, and metacognition which includes self-assessment and reflection.

TASKS:

The collection of the following tasks represents the level of depth, rigor and complexity expected of all second grade students to demonstrate evidence of learning.

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• High Roller

High Roller

- You will work in groups to play the game “High Roller.”
- Roll your die four times.
- Use the four numbers to make the largest number possible.
- Record your number.
- Once your number is written down you may not make changes to your number.
- Pass the die to the next student and continue to play until all students in the group have had five turns to roll the die.

Discussion, Suggestions, Possible Solutions

Students work in groups of two - four to play the game. Create a game board or chart with boxes in a row labeled with the place value (see below). Students should place the numbers from their rolls in the four boxes. A student in the group rolls the die four times. After each roll, each student fills in the number rolled in a box on their individual game card to try to make the largest number possible. Once the number is written they may not erase or make a change in the order of their numbers. After all four rolls have been completed, the students compare with their group members to determine who came up with the largest number. The game should be played multiple times for students to begin to develop strategies for number placement. Students should discuss their strategies for playing the game.

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Turn	Thousands ,	Hundreds	Tens	Ones
1.				
2.				
3.				
4.				

Different types of die could be used. For example, instead of the traditional 1-6 die, students could use 0-5 or 5-9 dice. After the game is played several times, students should discuss what they figured out about playing the game. Students should discuss their strategies for playing the game. Also, students should discuss what problems they encountered when playing the game. Problems could include rolling lots of small numbers and deciding where to place them, rolling a 3 and its placement.

Questions to ask the students:

What do you do with a 1 if the ones place is already filled?

How do you decide where to place a four?

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Extension:

Have students write about the strategy they use to play the game. Encourage them to write all they can about what strategy they use when they play.

Suggestions:

- *Students could also try to make the smallest number by playing the game “Low Roller.”*
- *Players could keep score of who had the biggest or smallest number during the game.*
- *Students could be required to write the word name for each number they built using both words and expanded notation.*

- **What’s My Number?**

What’s My Number?

- Choose any two-digit number.
- Think of a way to describe your number.
- Think of hints you could give your classmates so they can try to figure out your number.

Discussion, Suggestions, Possible Solutions

This activity helps students build flexibility using language and equivalent representations of numbers. Base ten manipulatives should be available if students desire to use them to visualize the numbers. Students could also draw pictures to help them make up their clues to find the mystery number. Children may begin with very simple, straightforward clues about their number. But eventually they will start to try to make up more difficult clues by combining the amount of ones, tens, or hundreds.

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Examples could be given like:

- *I have a 4 in my tens place and a 2 in my ones place. Who am I?*
- *I have 1 more ten than the number 14 and 3 ones. Who am I?*
- *I am 35. I have 25 ones. How many tens do I have?*
- *I have 1 ten, 5 hundreds, and 29 ones. Who am I?*

Student should be able to explain or show how they arrived at their solutions.

Extension:

- *Have students write and solve each other's clues and justify the solutions. Have students write their answer using numbers (standard form), number words, and expanded notation.*

• Base Ten Pictures

Base Ten Pictures

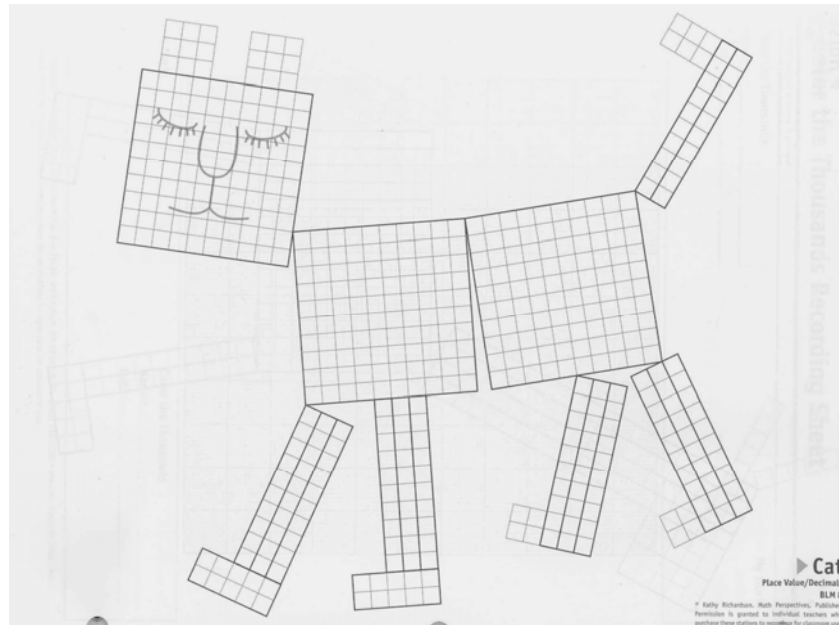
Adapted from Understanding Numbers: Place Value by Kathy Richardson – Math Perspectives p. 22, 23.

- Using centimeter graph paper or base-10 patterns, cut out blocks of 100, 10, and any combinations of ones.
- Arrange your ones squares, tens strips, and hundreds blocks to form a creative picture.
- Glue your pieces to your paper once they are arranged.
- After you have made the picture, label each part with the value that it represents.
- Find the picture's total by adding all the values together.
- Remember to include all work on your paper.
- Be creative!

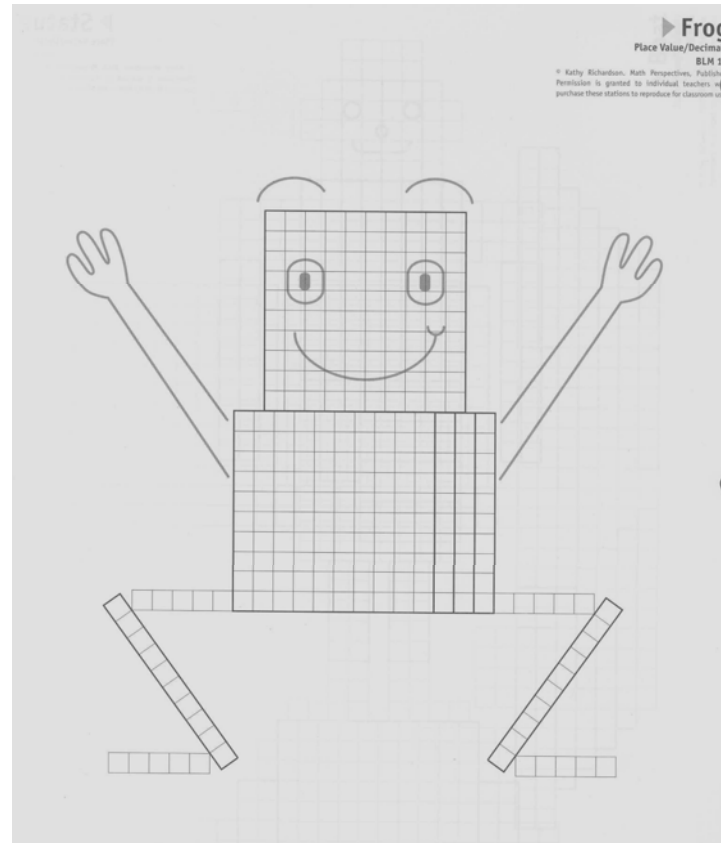
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Discussion, Suggestions, Possible Solutions

Provide students with centimeter graph paper. Have students trace the hundreds blocks and tens strips on the graph paper first to be sure they are marking the correct amount of squares. Encourage the children to be creative and to label each part with its value. This task provides an interesting way for students to work with groups of hundreds, tens, and ones. First, the students determine the number of hundreds, tens, and ones used to make the picture and then reorganize and combine to make a picture. Next they use the numbers to determine how much each picture is worth. The teacher may want to encourage students to write the number in expanded notation as well as in number words.



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• What I Have and What I Need

What I Have and What I Need

- Look at the chart you have been given.
- Think about the amount of money that you have and how much you end up with.
- Determine what coins could be added to your beginning amount to end up with the total.
- You may use money manipulatives if necessary.
- Complete the chart “What I have and What I need.”
- As you decide what you need to make the total, use tally marks to identify the number of each coin you will be using.
- Be creative! Many of these have more than one solution.

Discussion, Suggestions, Possible Solutions

You may want to begin by reading a poem like “Smart Money” by Shel Silverstein. Discuss what happens to the amount of money as it is exchanged.

Give each student a copy of the chart “What I have and What I need”. Have students complete the chart individually. Coins and coin mats should be available to assist students in making these decisions. After they have found a coin combination for each problem, have students compare their combination with a partner. After the partners have shared, allow the class to discuss the different combinations of coins that were used, whether they are correct, and how many different combinations there were.

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What I have	What I need				Total
	Penny	Nickel	Dime	Quarter	
23 cents					45 cents
58 cents					93 cents
15 cents					87 cents
6 cents					60 cents
50 cents					75 cents

- **Change and More Change**

Change and More Change

- Imagine you bought a candy bar from a candy machine. The candy bar cost 55 cents. You put \$1.00 in the machine.
- Using coins, count back the change you would receive.
- Draw the coins that show the amount of change.
- Show as many ways as you can to make the same amount. Which collection uses the most coins? Which collection uses the fewest coins?
- What else can be written about your coin collections?

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Discussion, Suggestions, Possible Solutions



\$.55



\$1.00



Buying a Candy Bar

Imagine you bought a candy bar from a candy machine. The candy bar cost 55 cents. You put \$1.00 in the machine.

- Using coins, count back the change you would receive. Draw or list the amount of change.
- Show some other ways you could make the same amount.
- Which collection uses the most coins? Which collection uses the fewest coins?
- What else can be written about your coin collections?

List or draw your answers here.

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In first grade, students exchange equivalent quantities of coins involving pennies, nickels, dimes and quarters; exchange equivalent quantities by making fair trades involving bills (\$1, \$5, \$10, and \$20); and count out a combination of bills needed to purchase items less than \$20. Provide students with coin manipulatives to assist in solving the problem. Students are expected to determine the amount of change they would receive back from \$1.00 when buying an item that costs \$.55. They should be able to come up with multiple solutions. Solutions should include combinations using the least amount of coins, and the largest amount of coins. Watch for counting strategies used when trying to find solutions.

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• Shopping for School Supplies

Shopping for School Supplies

- Before the first day of school, Mary Beth went to the store to buy some school supplies.
- Estimate (without paper and pencil) the price for each pair of school supplies.
- Determine if Mary Beth had enough money to buy the items.

Pencils	Binders	Crayons	Ruler	Paper	Scissors	Glue	Pens
\$.41	\$1.26	\$.37	\$0.76	\$0.65	\$0.99	\$0.84	\$1.01

Amount Mary Beth has to spend:	Items purchased:	Estimated cost:	Yes/No
\$2.00	Glue and a ruler		
\$1.25	Pens and crayons		
\$1.50	Scissors and pencils		
\$2.00	Binder and a ruler		
\$2.50	Pens and a binder		

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Discussion, Suggestions, Possible Solutions

Read the book like Bunny Money by Rosemary Wells about going to the store. Ask the students if any of them have helped shop for their school supplies this year. Tell them they are going to help Mary Beth's mother figure out if she has enough money to purchase different items.

*This activity should be done **orally** and with partners. Without using paper and pencil, have the pairs talk to each other about how they would estimate if they have enough money to purchase the combinations of school supplies. Listen for the use of **benchmarks** such as whole dollars, half dollars, and quarters. Be sure to have those students share to introduce the idea to the class. To encourage student responses, it may be necessary for the teacher to “model” the thinking he or she wants on an example problem.*

A sample student response for the first one would be: \$0.76 is less than a dollar and \$0.84 is less than a dollar, so if she has \$2.00 she has enough money to purchase a ruler and the glue. Money amounts and items may be adjusted to fit your students understanding of money.

*****Some students may bring up the issue of tax being added to the price when they go to the store. You may say that since we are working with estimations and not actual amounts they do not need to worry about tax at this time and it is a tax-free weekend.*****

- **Culminating Task**

This culminating task represents the level of depth, rigor, and complexity expected of all second grade students to demonstrate evidence of learning.

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Unit Two Task: “MONEY IN MY POCKET”

Money In My Pocket

- Read the problem on the overhead.
- Think about all the possibilities for the combinations of coins you could find.
- Complete 3 tasks on your Tic-Tac-Toe board that goes along with this activity.
- Remember that you have to have three items in a row to get Tic-Tac-Toe!

Suggestions for Classroom Use

While this task may serve as a summative assessment, it also may be used for teaching and learning. It is important that all elements of the task be addressed throughout the learning process so that students understand what is expected of them.

- Peer Review
- Display for parent night
- Place in portfolio
- Photographs

Discussion, Suggestions and Possible Solutions

Allow the students enough time to complete 3 of the 9 activities. Remind them to pay attention to the fact that their choices must connect three squares in a row. The activities may be made into a “Coins In My Pocket” book that can be shared with classmates.

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The task on the overhead could be similar to the one below:

Coins in My Pocket

I just pulled my raincoat out of the closet. It hasn't been worn since the last time it rained. I reached into my pocket and I found 10 coins. Without looking at them, I try to guess how much money I have.



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A sample of a Tic-Tac-Toe board that could be used with this activity is shown below:

Money in My Pocket Tic-Tac-Toe		
<p>List two of your combinations. Write the value of each combination. Create a Venn Diagram to compare the different amount of money and list the possible things you could buy with those amounts of money.</p>	<p>Use coin stamps or drawings to make a visual of at least three different groups of coins you could have found. Label each group with its total value.</p>	<p>Create a pocket and coins out of construction paper to represent the combination of coins found in your pocket. Label your pocket with the amount of money.</p>
<p>Write a song / rap about your money. It should tell a combination of coins and have the amount of money in the song.</p>	<p>Make a chart to show at least three different combinations of coins. Include the total value of the coins in the chart.</p>	<p>Make a pattern with the coins that you found in your pocket. Create another pattern if possible. Draw your patterns on a piece of paper and label them with the amount of money represented.</p>
<p>Draw a picture of the different combinations of coins. Be sure to separate each group and write how much each group is worth.</p>	<p>Graph 1 combination of coins and how many you had of each. Be sure to label all parts of your graph in a picture or bar graph.</p>	<p>Write a story about the coins you found, the amount of money, and how you spent your money.</p>

Extension: Students may complete more than 3 activities.