Georgia
Standards of Excellence
Curriculum Frameworks

Mathematics

GSE Third Grade

Unit 1: Number and Operations in Base Ten

Georgia Department of Education

Richard Woods, Georgia's School Superintendent

"Educating Georgia's Future"

TABLE OF CONTENTS

https://www.georgiastandards.org/Georgia-Standards/Pages/Implement-Math-Task-Classroom-Videos/What-Does-it-Look-Like-When-you-Implement-a-Task.aspx

IF YOU HAVE NOT READ THE THIRD GRADE CURRICULUM OVERVIEW IN ITS ENTIRETY PRIOR TO USE OF THIS UNIT, PLEASE **STOP** AND CLICK HERE: https://www.georgiastandards.org/Georgia-Standards/Frameworks/3rd-Math-Grade-Level-Overview.pdf Return to the use of this unit once you've completed reading the Curriculum Overview. Thank you.

OVERVIEW

In this unit, students will:

- Investigate, understand, and use place value to manipulate numbers.
- Build on understanding of place value to round whole numbers.
- Continue to develop understanding of addition and subtraction and use strategies and properties to do so proficiently and fluently.
- Draw picture graphs with symbols that represent more than one object.
- Create bar graphs with intervals greater than one.
- Use graphs and information from data to ask questions that require students to compare quantities and use mathematical concepts and skills.

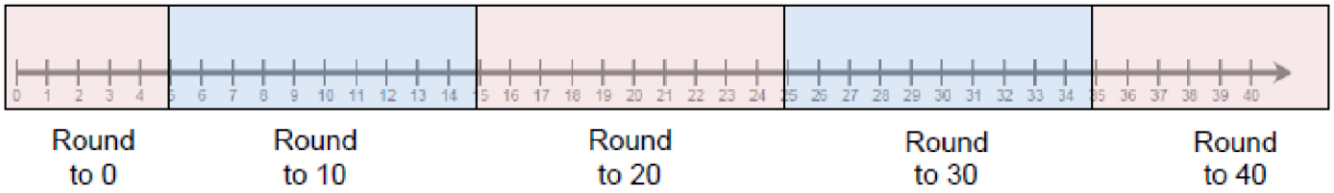
Number and Operations…

Prior to implementing rules for rounding**,** students need to have opportunities to investigate place value. A strong understanding of place value is essential for the developed number sense and the subsequent work that involves rounding numbers.

Building on previous understandings of the place value of digits in multi-digit numbers, place value is used to round whole numbers. Dependence on learning rules or mnemonics (5 or more rounds up, less than 5 rounds down) can be eliminated with strategies such as the use of a number line to determine which multiple of 10 or of 100 a number is closer. As students' understanding of place value increases, the strategies for rounding are valuable for estimating, justifying, and predicting the reasonableness of solutions in problem-solving.

Continue to use manipulatives such as hundreds charts and place-value charts. Have students use a number line or a roller coaster example to block off the numbers in different colors.

For example, this chart shows which numbers will round to the tens place.



Rounding can be expanded by having students identify all the numbers that will round to 30 or round to 200.

Strategies used to add and subtract two-digit numbers are now applied to fluently add and subtract whole numbers within 1000. These strategies should be discussed so that students can make comparisons and move toward efficient methods.

Number sense and computational understanding is built on a firm understanding of place value.

Table 1: Common Addition and Subtraction Situations

	Result Unknown	Change Unknown	Start Unknown
Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ?	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? 2 + ? = 5	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? ? + 3 = 5
Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? 5 – 2 = ?	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 5 – ? = 3	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? ? – 2 = 3
	Total Unknown	**Addend Unknown**	**Both Addends Unknown**
Put together/ Take apart	Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ?	Five apples are on the table. Three are red and the rest are green. How many apples are green? 3 + ? = 5, 5 – 3 = ?	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? 5 = 0 + 5, 5 = 5 + 0 5 = 1 + 4, 5 = 4 + 1 5 = 2 + 3, 5 = 3 + 2
	Difference Unknown	**Bigger Unknown**	**Smaller Unknown**
Compare	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? ("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? 2 + ? = 5, 5 – 2 = ?	(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? (Version with "fewer"): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? 2 + 3 = ?, 3 + 2 = ?	(Version with "more"): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have? (Version with "fewer"): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? 5 – 3 = ?, ? + 3 = 5

Adapted from Box 2-4 of Mathematics Learning in Early Childhood, National Research Council (2009, pp. 32,33

Graphing and Data…

Representation of a data set is extended from picture graphs and bar graphs with single-unit scales to scaled picture graphs and scaled bar graphs. Intervals for the graphs should relate to multiplication and division with 100 (product is 100 or less and numbers used in division are 100 or less). In picture graphs, use values for the icons in which students are having difficulty with multiplication facts. For example, represents 7 people. If there are three, students should use known facts to determine that the three icons represent 21 people. The intervals on the vertical scale in bar graphs should not exceed 100.

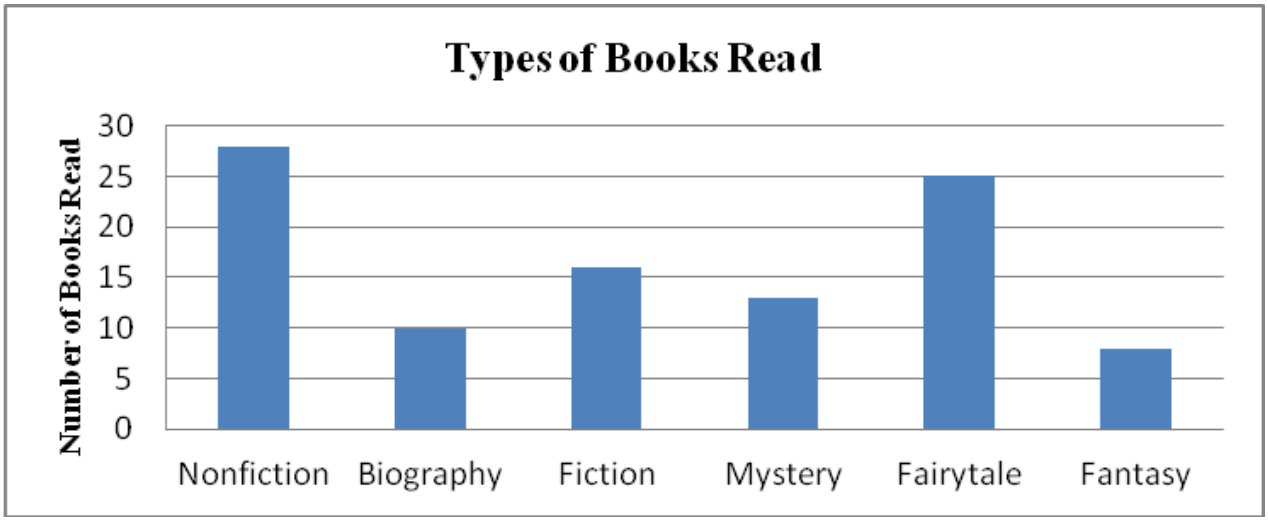
Students are to draw picture graphs in which a symbol or picture represents more than one object. Bar graphs are drawn with intervals greater than one. Ask questions that require students to compare quantities and use mathematical concepts and skills. Use symbols on picture graphs that student can easily represent half of, or know how many half of the symbol represents.

Examples of Common Graphing Situations

- **Pose a question:** Student should come up with a question. What is the typical genre read in our class?
- **Collect and organize data:** student survey
- **Pictographs:** Scaled pictographs include symbols that represent multiple units. Below is an example of a pictograph with symbols that represent multiple units. Graphs should include a title, categories, category label, key, and data. How many more books did Juan read than Nancy?

Number of Books Read	
Nancy	
Juan	
	 = 5 books

- **Single Bar Graphs:** Students use both horizontal and vertical bar graphs. Bar graphs include a title, scale, scale label, categories, category label, and data.



- **Analyze and Interpret data:**
- How many more nonfiction books were read than fantasy books?
- Did more people read biography and mystery books or fiction and fantasy books?
- About how many books in all genres were read?
- Using the data from the graphs, what type of book was read more often than a mystery but less often than a fairytale?
- What interval was used for this scale?
- What can we say about types of books read? What is a typical type of book read?
- If you were to purchase a book for the class library which would be the best genre? Why?

For more detailed information about unpacking the content standards, unpacking a task, math routines and rituals, maintenance activities and more, please refer to the Grade Level Overview.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education.

This section provides examples of learning experiences for this unit that support the development of the proficiencies described in the Standards for Mathematical Practice. The statements provided offer a few examples of connections between the Standards for Mathematical Practice and the Content Standards of this unit. The list is not exhaustive and will hopefully prompt further reflection and discussion.

1. **Make sense of problems and persevere in solving them.** Students make sense of problems involving rounding, addition and subtraction.

2. **Reason abstractly and quantitatively.** Students demonstrate abstract reasoning by connecting quantity to the relative magnitude of digits in numbers to 1000.

3. **Construct viable arguments and critique the reasoning of others.** Students construct and critique arguments regarding mental math strategies focusing on addition and subtraction.

4. **Model with mathematics.** Students are asked to use Base Ten blocks to model various understandings of place value and value of a digit. They record their thinking using words, pictures, and numbers to further explain their reasoning.

5. **Use appropriate tools strategically.** Students utilize a number line to assist with rounding, addition, and subtraction.

6. **Attend to precision.** Students attend to the language of real-world situations to determine appropriate ways to organize data.

7. **Look for and make use of structure.** Students relate the structure of the Base Ten number system to place value and relative size of a digit. They will use this understanding to add, subtract, and estimate.

8. **Look for and express regularity in repeated reasoning.** Students relate the properties and understanding of addition to subtraction situations.

Mathematical Practices 1 and 6 should be evident in EVERY lesson!

CONTENT STANDARDS

Content 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.

MGSE3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

MGSE3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

MGSE3.MD.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units – whole numbers, halves, or quarters.

For more detailed information about unpacking the content standards, unpacking a task, math routines and rituals, maintenance activities and more, please refer to the Grade Level Overview.

BIG IDEAS

Numbers and Operations in Base Ten

Place Value and Rounding…

- Place value is crucial when operating with numbers.
- Estimation helps us see whether or not our answers are reasonable.

Addition and Subtraction…

- Addition and subtraction are inverse operations; one undoes the other.
- Addition means the joining of two or more sets that may or may not be the same size. There are several types of addition problems, see the chart above.
- Subtraction has more than one meaning. It not only means the typical "take away" operation, but also can denote finding the difference between sets. Different subtraction situations are described in the chart above.

Data and Graphing

- Charts, tables, line plot graphs, pictographs, Venn diagrams, and bar graphs may be used to display and compare data.
- The scale increments used when making a bar graph is determined by the scale intervals being graphed.

ESSENTIAL QUESTIONS

- Why is place value important?
- How are addition and subtraction related?
- How can graphs be used to organize and compare data?
- How can we effectively estimate numbers?

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.

- place value
- standard and expanded forms of numbers
- addition
- subtraction
- addition and subtraction properties
- conceptual understanding of multiplication
- interpreting pictographs and bar graphs
- organizing and recording data using objects, pictures, pictographs, bar graphs, and simple charts/tables
- data analysis
- graphing

Fluency: Procedural fluency is defined as skill in carrying out procedures flexibly, accurately, efficiently, and appropriately. Fluent problem solving does not necessarily mean solving problems within a certain time limit, though there are reasonable limits on how long computation should take. Fluency is based on a deep understanding of quantity and number.

Deep Understanding: Teachers teach more than simply "how to get the answer" and instead support students' ability to access concepts from a number of perspectives. Therefore, students are able to see math as more than a set of mnemonics or discrete procedures. Students demonstrate deep conceptual understanding of foundational mathematics concepts by applying them to new situations, as well as writing and speaking about their understanding.

Memorization: The rapid recall of arithmetic facts or mathematical procedures. Memorization is often confused with fluency and automaticity. Fluency implies a much richer kind of mathematical knowledge and experience.

Number Sense: Students consider the context of a problem, look at the numbers in a problem, make a decision about which strategy would be most efficient in each particular problem. Number sense is not a deep understanding of a single strategy, but rather the ability to think flexibly between a variety of strategies in context.

Fluent students:

- flexibly use a combination of deep understanding, number sense, and memorization.
- are fluent in the necessary baseline functions in mathematics so that they are able to spend their thinking and processing time unpacking problems and making meaning from them.
- are able to articulate their reasoning.
- find solutions through a number of different paths.

For more about fluency, see: http://www.youcubed.org/wp-content/uploads/2015/03/FluencyWithoutFear-2015.pdf and: http://joboaler.com/timed-tests-and-the-development-of-math-anxiety/

STRATEGIES FOR TEACHING AND LEARNING

(Information adapted from North Carolina DPI Instructional Support Tools)

Prior to implementing rules for rounding, students need to have opportunities to investigate place value. A strong understanding of place value is essential for the developed number sense and the subsequent work that involves rounding numbers.

Building on previous understandings of the place value of digits in multi-digit numbers, place value is used to round whole numbers. Dependence on learning rules can be eliminated with strategies such as the use of a number line to determine which multiple of 10, or of 100, a number is nearest. As students' understanding of place value increases, the strategies for rounding are valuable for estimating, justifying and predicting the reasonableness of solutions in problem-solving.

Strategies used to add and subtract two-digit numbers are now applied to fluently add and subtract whole numbers within 1000. These strategies should be discussed so that students can make comparisons and move toward efficient methods.

For additional assistance with this unit, please watch the unit webinar:
https://www.georgiastandards.org/unit-webinar

SELECTED TERMS AND SYMBOLS

The following terms and symbols are often misunderstood. These concepts are not an inclusive list and should not be taught in isolation. However, due to evidence of frequent difficulty and misunderstanding associated with these concepts, teachers should pay particular attention to them and how their students are able to explain and apply them.

The terms below are **for teacher reference only** and are not to be memorized by the students. Teachers should present these concepts to students with models and real-life examples. Students should understand the concepts involved and be able to recognize and/or demonstrate them with words, models, pictures, or numbers. Mathematics Glossary

- add
- addend
- addition
    - associative property of addition
    - commutative property of addition
    - identity property of addition
- bar graph
- chart
- difference
- expanded form

- graph
- increment
- interval
- inverses
- line plot graph
- pictograph
- place value
- properties
- round
- scale
- standard form
- strategies
- subtract
- subtraction
- sum
- table

TASKS

The following tasks represent the level of depth, rigor, and complexity expected of all students. These tasks or a task of similar depth and rigor should be used to demonstrate evidence of learning. It is important that all standards of a task be addressed throughout the learning process so that students understand what is expected of them. While some tasks are identified as performance tasks, they may also be used for teaching and learning (constructing task).

TASK DESCRIPTIONS

Scaffolding Task	Tasks that build up to the learning task.
Constructing Task	Constructing understanding through deep/rich contextualized problem-solving tasks.
Practice Task	Tasks that provide students opportunities to practice skills and concepts.
Culminating Task	Designed to require students to use several concepts learned during the unit to answer a new or unique situation. Allows students to give evidence of their own understanding toward the mastery of the standard and requires them to extend their chain of mathematical reasoning.

Intervention Table	The Intervention Table provides links to interventions specific to this unit. The interventions support students and teachers in filling foundational gaps revealed as students work through the unit. All listed interventions are from New Zealand's Numeracy Project.
Formative Assessment Lesson (FAL)	Lessons that support teachers in formative assessment which both reveal and develop students' understanding of key mathematical ideas and applications. These lessons enable teachers and students to monitor in more detail their progress towards the targets of the standards.
3-Act Task	A Three-Act Task is a whole-group mathematics task consisting of 3 distinct parts: an engaging and perplexing Act One, an information and solution seeking Act Two, and a solution discussion and solution revealing Act Three. More information along with guidelines for 3-Act Tasks may be found in the ***Guide to Three-Act Tasks*** on georgiastandards.org.

Task Name	Task Type *Grouping Strategy*	Content Addressed	Standard(s)	Description
Three Other Ways	Scaffolding Tasks *Partners/Small Group Task*	Place Value, Addition and Subtraction	MGSE3.NBT.1 MGSE3.NBT.2	This task provides an opportunity for students to decompose numbers in multiple ways. This will help them easily manipulate numbers as needed in computation, as well as understand the value of digits in numbers when rounding.
Island Hop	Constructing Task *Whole/Small Group Task*	Rounding numbers to the nearest 10	MGSE3.NBT.1	This task is an introductory lesson for rounding. Students build this understanding using a number line.
Shake, Rattle, and Roll	Constructing Task *Partner/Small Group Task*	Rounding, Using estimation and mental math with addition	MGSE3.NBT.1 MGSE3.NBT.2	This task focuses on rounding as well as the understanding of the value of a digit.
The Great Round Up!	Practice Task *Small Group Task*	Place Value, Rounding	MGSE3.NBT.1	This task is used to help develop the understanding of the value of a digit as well as to support rounding concepts.
Mental Mathematics	Constructing Task *Whole Class Task*	Using and sharing mental math strategies	MGSE3.NBT.2	This task builds on the idea of various mental math strategies that could easily be addressed in Number Talks throughout the year.
Perfect 500!	Constructing Task *Small Group/Partner Task*	Mental Math with sums of 100	MGSE3.NBT.2	This task involves estimation with addition. It utilizes many mental math strategies developed in number talks and prior tasks.
Take 1,000	Constructing Task *Partner/Small Group Task*	Mental Math with combinations of 100	MGSE3.NBT.2	This task involves estimation with addition. It utilizes many mental math strategies developed in Number Talks and prior tasks.

Piggy Bank	3-Act Task *Whole Group*	Addition/Subtraction Problem Solving	MGSE3.NBT.2	In this task, students will view a video and tell what they noticed. Next, they will be asked to discuss what they wonder about or are curious about. Students will then use mathematics to answer their own questions.
Let's Think About Addition and Subtraction!	Scaffolding Tasks *Individually, Pairs, or Small Group Task*	Addition, Subtraction	MGSE3.NBT.2	In this task, students will solve word problems requiring addition and subtraction.
The Power of Properties	Constructing Task *Individual/Partner Task*	Commutative, Identity and Associative Properties	MGSE3.NBT.2	This task builds on the relationship of addition and subtraction by developing the understanding of the properties.
Elementary Formative Assessment Lesson	FAL *Individual task*	Strategies for Subtraction	MGSE3.NBT.2	This lesson is intended to help assess how well students apply and understand a variety of different subtraction strategies.
Take Down!	Practice Task *Partner Task*	Subtraction	MGSE3.NBT.2	In this task, students will use mental math to solve subtraction problems.
Happy to Eat Healthy	Constructing Task *Individual/Partner Task*	Addition/Subtraction Problem Solving	MGSE3.NBT.1 MGSE3.NBT.2	In this task, students use a menu to decide which items to purchase given a specific amount of money to spend
Field Day Fun	Constructing Task *Individual/Partner Task*	Addition/Subtraction Problem Solving	MGSE3.NBT.2	In this task, students will solve addition and subtraction word problems.
I Have a Story, You Have a Story	Constructing Task *Individual/Partner Task*	Understanding and writing addition and subtraction word problems	MGSE3.NBT.2	In this task, students will write their own story problems.
The Information Station!	Scaffolding Tasks *Individually, Pairs, or Small Group Task*	Data and Graphing	MGSE3.MD.3 MGSE3.MD.4	In this task, students will create different graphs after collecting data

It's a Data Party!	Constructing Task *Individual/Partner Task*	Data, graphing, problem solving	MGSE3.MD.3 MGSE3.NBT.2	In this task, students will create different graphs after collecting data on different types of party food.
What's Your Favorite?	Constructing Task *Individual/Partner Task*	Data, graphing, problem solving	MGSE3.MD.3 MGSE3.NBT.1 MGSE3.NBT.2	Students survey their classmates to collect data and then display the data using pictographs and Venn diagrams.
Cut and Plot!	Scaffolding Tasks *Partners/Small Groups*	Measurement, data, graphing	MGSE3.MD.4	In this task, students will measure varying string lengths and create a line plot.
What's the Story Here?	Culminating Task *Individual/Partner Task*	Addition, Subtraction, Rounding	MGSE3.NBT.1 MGSE3.NBT.2	In this task, students will create a book based on all standards covered in Unit 1. This culminating task represents the level of depth, rigor, and complexity expected of all third grade students to demonstrate evidence of learning.

Intervention Table

The Intervention Table below provides links to interventions specific to this unit. The interventions support students and teachers in filling foundational gaps revealed as students work through the unit. All listed interventions are from New Zealand's Numeracy Project.

Cluster of Standards	Name of Intervention	Snapshot of summary or Student I can statement. . .	Materials Master
Numbers and Operations in Base Ten Use place value understanding and properties of operations to perform multi-digit arithmetic MGSE3.NBT.1 MGSE3.NBT.2	Rounding: Closest to	Round to the nearest ten or hundred	
	Rounding	Round to the nearest ten or hundred	
	Rounding to the Nearest 100	Round to the nearest hundred	
	Find the Biggest Total	Develop knowledge of place value – tens and ones in a number	
	Blast 1000	Practice counting backwards and forwards from 100-1000, identify ten more/less and 100 more/less	
	Zap	Recall groupings within 100	MM 4-14
	Jumping the Number Line	Solve addition and subtraction problems using tidy numbers	MM 4-8 MM 5-12
	Don't Subtract – Add!	Solve subtraction problems by using addition	MM 4-9
	Something's Hiding	Determine how many tens and ones are hidden	
	Bridges	Addition and subtraction to 100	MM 4-34
Measurement and Data Represent and interpret data MGSE3.MD.3 MGSE3.MD.4	Worms and More	Compare the length of objects beginning at the same starting point	

FORMATIVE ASSESSMENT LESSONS (FALS)

Formative Assessment Lessons are designed for teachers to use in order to target specific strengths and weaknesses in their students' mathematical thinking in different areas. A Formative Assessment Lesson (FAL) includes a short task that is designed to target mathematical areas specific to a range of tasks from the unit. Teachers should give the task in advance of the delineated tasks and the teacher should use the information from the assessment task to differentiate the material to fit the needs of the students. The initial task should not be graded. It is to be used to guide instruction. Teachers are to use the following Formative Assessment Lessons (FALS) Chart to help them determine the areas of strengths and weaknesses of their students in particular areas within the unit.

Formative Assessments	Content Addressed	Pacing (May be used before and after these tasks)
ELEMENTARY FORMATIVE ASSESSMENT LESSONS	Strategies for Subtraction	Take Down! Happy to Eat Healthy Field Day Fun

SCAFFOLDING TASK: THREE OTHER WAYS

Back to Task Table

(Adapted from Student Centered Mathematics Volume 2, Van de Walle)

This task provides an opportunity for students to decompose numbers in multiple ways. This will help them easily manipulate numbers as needed in computation, as well as understand the value of digits in numbers when rounding.

CONTENT STANDARDS

MGSE3.NBT. 1 Use place value understanding to round whole numbers to the nearest 10 or 100.

MGSE3.NBT. 2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationships between addition and subtraction.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

In Second Grade, students read, write and compare numbers to 1000. This task builds on that previous understanding.

COMMON MISCONCEPTIONS

As students enter third grade, they are expected to know numbers up to 1000 (CCSSO, 2010). Here the issue is not one of connecting a count-by-ones concept to a group of 1000, but rather seeing how a group of 1000 can be understood as a group of 10 hundreds as well as 100 tens and 1000 single ones. As a means of introducing thousands as groups of 10 hundreds and also 100 tens, consider the following estimation activity. (Van de Walle, page 160)

ESSENTIAL QUESTIONS

- How can I decompose numbers using place value in multiple ways?
- Can decomposing numbers help with addition and subtraction of two-digit numbers?
- How does place value connect with regrouping in addition and subtraction?

MATERIALS

- base-ten blocks
- attached game boards

GROUPING

Students work in groups or pairs.

NUMBER TALK *(SMP 1, 2, 3, 6, and 8)*

In the Third Grade Curriculum Overview, the importance of giving students opportunities to mentally compute and explain computational strategies is discussed. *Number Talks* is an excellent way to do this. Beginning your lesson daily with between 5 and 15 minutes of time dedicated to students sharing the authority of determining whether answers are accurate, and are expected to think through all solutions and strategies carefully (Parrish, 2010). During a *Number Talk*, the teacher is not the definitive authority. The teacher is the facilitator and is listening and learning for and from the students' natural mathematical thinking. The teacher writes a problem horizontally on the board in whole group or a small setting. The students mentally solve the problem and share with the whole group HOW they derived the answer. They must justify and defend their reasoning. The teacher simply records the students thinking and poses extended questions to draw out deeper understanding for all. The effectiveness of numbers talks also has a lot to do with the routines and environment that is established. Students must be given time to think quietly without the pressure of their peers. To develop this, the teacher now should establish a signal of some sort to identify that one has a strategy to share. One way to do this is to place a finger on their chest indicating that they have one strategy to share. If they have two strategies to share, they place out two fingers on their chest and so on.

Number Talk problem possible student responses:

47 + 33	**Possible Strategy #1-** 40 + 30 = 70 and 7 + 3 = 10 Then 70 + 10 = 80	**Possible Strategy #2** 47 + 30 = 77 Then 77 + 3 = 80
76 - 9	76 – 10 = 66 Then 66 + 1 = 67	Started on 76 on the number line and counted back 9 to 67

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

This task will help students understand that numbers can be decomposed in multiple ways to help them be able to easily manipulate them as needed in computation.

PART I
Van de Walle Activity 10.5 Three Other Ways (*SMP 1, 2, 4, and 5)*

Students work in groups or pairs. First, they show 463 on their desks with base-ten materials in the standard representation. Next, they find and at least three other ways of representing this number and record on a piece of paper or their math journal.
A variation is to challenge students to find a way to show amount with a specific number of pieces. "Can you show 463 with 31 pieces?" (There is more than one way to do this.) Students can get quite involved with finding all the ways to show a three-digit number.

PART II (*SMP 1, 2, 3, 4, and 5)*

Students will work in small groups of 2 or 3. Students will cut out the sheets of provided cards. Students will play a game of WAR using these cards. They will pass out all the cards to the players in their group. Each student will flip over the top card in their stack. The students will each calculate the number represented by their card. The student with the largest value will get to collect all the cards that are flipped up. Play will continue until all cards have been flipped up and compared. The student that has the most cards at the end is the winner.
Or students can create their own game board and play the game.

FORMATIVE ASSESSMENT QUESTIONS

- How can you find all the ways to decompose a number?
- When would you need to decompose a number to help you solve a problem?

DIFFERENTIATION

Extension Van de Walle adapted Activity 10.7 Base-Ten Riddles, p. 161 (SMP 1, 2, 4, 6, 7, and 8)

- Base – Ten Riddles can be presented orally or in written form. In either case, students should use base-ten materials to help solve the riddles. The examples here illustrate a variety of different levels of difficulty. Have students write new riddles when they complete these.
    - I have 23 ones and 4 tens. Who am I?
    - I have 4 hundreds, 12 tens, and 6 ones. Who am I?
    - I have 30 ones and 3 hundreds. Who am I?
    - I am 45. I have 25 ones. How many tens do I have?
    - I am 341. I have 22 tens. How many hundreds do I have?
    - I have 13 tens, 2 hundreds, and 21 ones. Who am I?
    - If you put 3 more hundreds with me, I would be 1150. Who am I?
    - I have 23 hundreds, 16 tens, and 2 ones. Who am I?

Intervention

Start with showing mixed arrangements of base-ten materials and having students give the base-ten name (4 hundreds, 3 tens, and 8 ones) and the standard name (438). Vary the arrangement from one example to the next by changing only 1 type of piece. That is, add or remove only ones or only tens or only hundreds. It is important for students with disabilities to see counterexamples, so actively point out that some students wrote 200803 for 283, and ask them whether that is correct. These conversations allow students to explore their misunderstandings and focus on the place-value system more explicitly. (Van de Walle, p. 161)

Intervention Table

I Declare War! Game Board

13 tens 12 ones	**18 tens 27 ones**	**2 hundreds 20 tens 11 ones**	**60 tens**
1 hundred 10 tens	**600 ones**	**3 hundreds 34 tens 36 ones**	**100 tens**
70 tens 13 ones	**2 hundreds 34 tens 19 ones**	**39 tens 34 ones**	**28 tens 45 ones**
45 tens 18 ones	**46 tens 8 ones**	**8 hundreds 17 ones**	**60 tens 400 ones**
25 tens 25 ones	**2 hundreds**	**20 tens**	**31 tens**
51 tens 10 ones	**3 hundreds 30 tens**	**4 hundreds 2 tens 6 ones**	**2 hundreds 21 tens 18 ones**
6 hundreds 3 tens 21 ones	**3 hundreds 20 tens 22 ones**	**3 hundreds 41 tens 25 ones**	**5 hundreds 36 ones**

I Declare War! Student Game Board

SCAFFOLDING TASK: "THE ISLAND HOP!"

Back to Task Table

This task is an introductory lesson for rounding. Students build this understanding using a number line.

CONTENT STANDARDS

MGSE3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Reason abstractly and quantitatively.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

This will be the students' first experience with the estimation strategy of rounding. Prior to Kindergarten students have had experience reasoning through the ideas of more and less, and shorter and longer. In kindergarten students began working with benchmark numbers and estimating with measurement. This continued through second grade.

Rounding is used to simplify computation in a story, chart or conversation and should be context specific. "To round a number simply means to substitute a nice number that is close, so that some computation can be done more easily." For example, if you are talking about the amount of time it takes you to do homework, most people will not say 57 minutes, they will say about an hour. The first number is a precise amount of time. The second number refers to an approximate amount of time for better communication. (Van de Walle, p. 47)

COMMON MISCONCEPTIONS

The use of terms like "round up" and "round down" confuses many students. for example, the number 37 would round to 40 or they say it "rounds up". The digit in the tens place is changed from 3 to 4 (rounds up). This misconception is what causes the problem when applied to rounding down. The number 32 should be rounded (down) to 30, but using the logic mentioned for rounding up, some students may look at the digit in the tens place and take it to the previous number, resulting in the incorrect value of 20. To remedy this misconception, students need to use a number line to visualize the placement of the number and/or ask questions such as: "What multiples of ten are 32 between and which is it closer to?" Developing the understanding of what the answer choices are before rounding

can alleviate much of the misconception and confusion related to rounding. (Adapted from Ohio Department of Education Model Curricula)

ESSENTIAL QUESTIONS

- How are digits in a number related?
- What can we learn about the value of a number by examining its digits?
- What is an effective way to estimate numbers?

MATERIALS

- Sidewalk Chalk
- Number line, or 0-99 chart

GROUPING

Students should work in groups of 3 or 4.

NUMBER TALK (*SMP 1, 2, 3, 6, and 8)*

In the Third Grade Curriculum Overview, the importance of giving students opportunities to mentally compute and explain computational strategies is discussed. *Number Talks* is an excellent way to do this. Beginning your lesson daily with between 5 and 15 minutes of time dedicated to students sharing the authority of determining whether answers are accurate, and are expected to think through all solutions and strategies carefully (Parrish, 2010). During a *Number Talk*, the teacher is not the definitive authority. The teacher is the facilitator and is listening and learning for and from the students' natural mathematical thinking. The teacher writes a problem horizontally on the board in whole group or a small setting. The students mentally solve the problem and share with the whole group HOW they derived the answer. They must justify and defend their reasoning. The teacher simply records the students thinking and poses extended questions to draw out deeper understanding for all. The effectiveness of numbers talks also has a lot to do with the routines and environment that is established. Students must be given time to think quietly without the pressure of their peers. To develop this, the teacher now should establish a signal of some sort to identify that one has a strategy to share. One way to do this is to place a finger on their chest indicating that they have one strategy to share. If they have two strategies to share, they place out two fingers on their chest and so on.

Number Talk problem possible student responses:

29 + 8	**Possible Strategy #1-** 29 can become 30 and take 1 from 8 reducing it to 7.	**Possible Strategy #2** 20 plus 17
54 + 86	50 + 80 + 10=	Add 6 to 54 to get 60. Then 60 + 80 = 140

Number talks often have a focus strategy such as "Making Tens", or "Compensation". You may start with a number string such as 7 + 3. Once students discuss their strategies for this expression, a closely related one can follow. (7 + 4, 7 + 2, 7 + 5). Students will begin to develop relationships between the expressions within the number string. Below is a video link of a third grade Number Talk.
http://www.youtube.com/watch?v=OeEjoEQQNNI&list=PLA80594C7CF447011

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I (SMP 1, 3, 4, 5 and 6)

The teacher will begin the lesson outside on the sidewalk. S/he will introduce the decade numbers. The teacher may have the students count by 10s to 100. As the students are counting the teacher will use sidewalk chalk to draw "islands" on the sidewalk. Be sure to leave enough room in between each decade number to make the tick marks for the numbers in between.

Next, the class will discuss what can go in between the decade numbers. Have the groups of students, using sidewalk chalk, record the numbers that are in between the decade numbers. *Please note that the measurement between the numbers will probably not be equal. As long as they do not skip any numbers it should be fine.*

The teacher will now set the stage for rounding. You can start by asking a series of questions:

- What is estimating?
- Does anyone know why we estimate?

Explain to the students that today they will learn a new estimation strategy. They are going to round to the nearest 10. "Let's look at the islands with the decade numbers, what do you notice?" Students may respond with things like, the islands count by 10s, or they are decade numbers.
When rounding, you are looking for nice numbers like the decade numbers. Ask a student to stand on a number such as 43. The student will locate 43 on the number line and stand there. The teacher will lead the students into a discussion about the nearest decade number. They can even walk/hop to the closest island by counting the steps. Continue this with other students allowing them gain an understanding of the nearest "nice number". Please avoid teaching such things as, "5 or higher, and 4 or lower". We want students to conceptualize the rounding and not memorize rules. Allow students to grapple with and discuss this in order to develop a deeper understanding.

Part II (SMP 1, 4, 5, 6, and 8)

Students will use the "Island Hop" Scavenger Hunt task sheet to answer questions about rounding. Students should use a number line (cut the attached 0-99 chart to create) or use the 0-99 chart to complete the task.

FORMATIVE ASSESSMENT QUESTIONS

- How do you determine the closest 10?
- Have you found all of the possible answers? Explain.
- When might rounding be useful?
- Can you create an additional number clue?

DIFFERENTIATION

Extension

- Have students practice rounding to the nearest ten using three-digit numbers.

Intervention

- Students can work with only 2 decade numbers at a time. They could use counters to mark their spots.

Intervention Table

0-99 Chart

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

0-99 Chart

90	91	92	93	94	95	96	97	98	99
80	81	82	83	84	85	86	87	88	89
70	71	72	73	74	75	76	77	78	79
60	61	62	63	64	65	66	67	68	69
50	51	52	53	54	55	56	57	58	59
40	41	42	43	44	45	46	47	48	49
30	31	32	33	34	35	36	37	38	39
20	21	22	23	24	25	26	27	28	29
10	11	12	13	14	15	16	17	18	19
0	1	2	3	4	5	6	7	8	9

Name_____ Date_____

THE ISLAND HOP SCAVENGER HUNT

1. I am a number that rounds to 40. What can I be? Could I be another number? Justify your thinking.

2. I am a number that rounds to 90. What can I be? Could I be another number? Justify your thinking.

3. I am a number that rounds to thirty. One of my digits is 2. What number am I? Could I be another number? Justify your thinking.

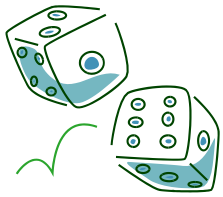
4. I am a number that rounds to 60. What can I be? Could I be another number? Justify your thinking.

5. Jalynn told Tameka that she has about 50 stickers. Tameka has 48 stickers. Knowing that Jaylynn rounded her total, is it possible that Tameka has more stickers than Jalynn? Justify your thinking using words, pictures and numbers.

6. Jay has ***about*** 70 baseball cards. Mark has 72 baseball cards. Is it possible for Jay to have more baseball cards than Mark? Justify your thinking using words, pictures, and numbers.

CONSTRUCTING TASK: SHAKE, RATTLE, AND ROLL

Back to Task Table



This task focuses on rounding as well as the understanding of the value of a digit.

CONTENT STANDARDS

MGSE3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

This task is designed to develop addition practice, mental math, and estimation skills. It will also provide exposure to rounding concepts. You may want to use a book similar to *Mental Math in the Primary Grades* by Jack Hope, R. Reys, Larry Leutizinger, Barbara Reys, and Robert Reys to practice mental math with the class as a whole group.

Use all available opportunities during the day to incorporate the use of estimation and rounding, for example, determining to which multiple of 10 or 100 a given number is nearest. This skill can be supported with the use of a number line 0-99 chart and/or a hundreds chart. Students should have these tools available for this task. Alternatively, students can create a number line to determine the closest multiple of ten. A student sheet with open number lines could be provided. An example of an open number line is shown below.

For the number 536, students can fill in the numbers around 536, including the two closest multiples of ten as shown below. Then looking at the number line, students can determine the nearest multiple of ten that is the closest to 536. In this case, 540 is 4 away, but 530 is 6 away, so 540 is the closest multiple of ten.

For the number 163, students can follow a similar procedure to round to the nearest hundred. Students will need to determine the multiple of one hundred that is the closest to 163. In this case 100 is more than 60 away, but 200 is less than 40 away, so 200 is the closest multiple of one hundred.

100 110 120 130 140 150 160 170 180 190 200

Rounding skills will help students determine reasonableness of answers, a vital skill for standardized tests, as well as everyday living. If you incorporate calendar activities into your instruction, many opportunities present themselves for activities with rounding. Also, be sure students make connections between the following:

- Counting by multiples of ten and hundred
- Multiplying by multiples of ten.
- Estimating to the nearest ten and hundred before adding or multiplying.

Students should be proficient in determining to which multiple of ten or hundred any given number is nearest. They should also be comfortable adding multiples of ten, hundred, and thousand (For example, 200 + 600 = 800).

COMMON MISCONCEPTIONS

The use of terms like "round up" and "round down" confuses many students. for example, the number 37 would round to 40 or they say it "rounds up". The digit in the tens place is changed from 3 to 4 (rounds up). This misconception is what causes the problem when applied to rounding down. The number 32 should be rounded (down) to 30, but using the logic mentioned for rounding up, some students may look at the digit in the tens place and take it to the previous number, resulting in the incorrect value of 20. To remedy this misconception, students need to use a number line to visualize the placement of the number and/or ask questions such as: "What multiples of ten are 32 between and which is it closer to?" Developing the understanding of what the answer choices are before rounding can alleviate much of the misconception and confusion related to rounding. (Adapted from Ohio Department of Education Model Curricula)

ESSENTIAL QUESTIONS

- What strategies can I use to help me add in my mind more quickly and efficiently?
- What is an effective way to round numbers to the nearest hundred?

MATERIALS

- Two six-sided dice
- Calculator
- "Shake, Rattle, and Roll" Recording Sheet

GROUPING

Partner/Small Group Task

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

As discussed in the opening lesson of this unit, there are many strategies that can be developed using Number Talks. Finding "Landmark" or "Friendly Numbers" are easy to use when computing mentally (Parrish, 2010). This would be a great strategy to focus on prior to completing the next couple of tasks as students are developing their mental math and rounding. To use this strategy, students may easily adjust one or both numbers by adding or subtracting amounts to make the numbers "friendly". Most students are comfortable adding in multiples of 10, so this strategy is quite efficient. For example, if presented with 39 + 27 =, the student may add one to 39 to make 40 and add 40 + 27 to get 67 and subtract one to get the final sum of 66. Number strings such as these, can be easily created.

40 + 30
39 + 29
38 + 28
38 + 29
49 + 16

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION (SMP 1, 2, 3, 5, 6, 7, and 8)

In this task, students play a game with dice that enables them to build estimation and mental math concepts as they practice addition skills and strategies and determine to which multiple of one hundred a given number is nearest.

Task Directions

Students will follow the directions below from the "Shake, Rattle and Roll" Recording Sheet.

> This is a two-player game that will help you practice your estimation and addition skills. The goal of the game is to be the person with the most points at the end of ten turns.
>
> 1. Play with a partner. You will need 3 dice, a recording sheet for each player, and a calculator.
> 2. Player one rolls the three dice and forms two numbers, the largest possible number and the smallest possible number, as shown below. For example, using the digits 5, 4, and 4 make the numbers 544 and 445. Find the nearest multiple of 100 for each number, and then using mental math, add to find an estimate. Estimated sum = 500 + 400 = 900.
> 3. Player one records the estimate on the game recording sheet to end round 1. Your partner must agree with your estimation, using a calculator to check if needed.
> 4. Player two takes a turn, following steps 2 and 3 above.
> 5. Players take turns for a total of six rounds.
> 6. After six rounds, each player finds the total sum of their estimates. The player with the higher sum wins the game.

FORMATIVE ASSESSMENT QUESTIONS

- Explain how you found the closest multiple of one hundred.
- Do you think your estimated sum is higher or lower than the actual sum? Why? How could you check?
- What kinds of situations in life might be easier if you knew how to estimate and add numbers like this?

DIFFERENTIATION

Extension

- Ask students to play the game again, estimating to the tens place. Does that change the game? If so, how?
- Play the game with four dice. Students get to choose three of the numbers rolled (or two as an intervention) and players have to get closest to 3000. Whoever is closest (over or under 3000) wins the game. This changes the strategy and allows opportunities for teachers to ask students what they hope to roll on the last roll based on what they have so far.

Intervention

- Use number lines, number charts, and models to help students who are having difficulty determining to which multiple of hundred their number is nearest. Use counting up/counting back to the nearest multiple of hundred and compare the results to determine which multiple of hundred a number is closest. (SMP 5)
- Students can play the game using fewer dice, adjusting the game accordingly. Once students become comfortable with fewer dice, they can challenge themselves by playing the game with the required three dice.

Intervention Table

TECHNOLOGY CONNECTION

http://www.shodor.org/interactivate/activities/EstimatorFour/?version=1.6.0_02&browser=MSIE&vendor=Sun_Microsystems_Inc. A "Four in a Row" game where players get checkers when they quickly and efficiently estimate a sum to two numbers.

Name _____ Date _____

Shake, Rattle, and Roll

Game Directions

This is a two-player game that will help you build your estimation and mental math concepts as you practice addition skills and strategies. The goal of the game is to be the person with the most points at the end of ten turns.

Directions:

1. Play with a partner. You will need 3 dice, a recording sheet for each player, and a calculator.
2. Player one rolls the three dice and forms two numbers, the largest possible number and the smallest possible number, as shown below.

Example: Using the digits 5, 4, and 4 make the numbers 544 and 445. Find the nearest multiple of 100 for each number, and then using mental math, add to find an estimate.

Estimated sum = 500 + 400 = 900

3. Player one records the estimate on the game recording sheet to end round 1. Your partner must agree with your estimation, using a calculator to check if needed.

4. Player two takes a turn, following steps 2 and 3 above.

5. Players take turns for a total of six rounds.

6. After six rounds, each player finds the sum of their estimates. The player with the higher sum wins the game.

Shake, Rattle, and Roll Game

Player 1 _____

Round	Dice Numbers	Smallest Number	Nearest Multiple of 100	Largest Number	Nearest Multiple of 100	Estimated Sum
1						
2						
3						
4						
5						
6						
						Total

Shake, Rattle, and Roll Game

Player 2 _____

Round	Dice Numbers	Smallest Number	Nearest Multiple of 100	Largest Number	Nearest Multiple of 100	Estimated Sum
1						
2						
3						
4						
5						
6						
						Total

PRACTICE TASK: "THE GREAT ROUND UP!"

Back to Task Table

(Adapted from North Carolina's Core Essentials Mathematics Program)

This task is used to help develop the understanding of the value of a digit as well as to support rounding concepts.

CONTENT STANDARDS

MGSE3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

"To round a number simply means to substitute a nice number that is close so that some computation can be done more easily." Rounding is used to simplify computation in a story, chart or conversation. For example, if you are talking about the amount of time it takes you to do homework, most people will not say 57 minutes, they will say about an hour. The first number is a precise amount of time and the second number refers to an approximate amount of time for better communication. (Van de Walle p. 47)

COMMON MISCONCEPTIONS

The use of terms like "round up" and "round down" confuses many students. for example, the number 37 would round to 40 or they say it "rounds up". The digit in the tens place is changed from 3 to 4 (rounds up). This misconception is what causes the problem when applied to rounding down. The number 32 should be rounded (down) to 30, but using the logic mentioned for rounding up, some students may look at the digit in the tens place and take it to the previous number, resulting in the incorrect value of 20. To remedy this misconception, students need to use a number line to visualize the placement of the number and/or ask questions such as: "What multiples of ten are 32 between and which is it closer to?" Developing the understanding of what the answer choices are before rounding can alleviate much of the misconception and confusion related to rounding. (Adapted from Ohio Department of Education Model Curricula)

ESSENTIAL QUESTIONS

- How can we determine the value of a digit in relation to its place in a number?
- How can we effectively estimate numbers?

MATERIALS

- Three Number Cubes
- "The Great Round Up" Recording Sheet

GROUPING

Students should work in groups of 3 or 4.

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

As discussed in the opening lesson of this unit, there are many strategies that can be developed using Number Talks. Finding "Landmark" or "Friendly Numbers" are easy to use when computing mentally (Parrish, 2010). This would be a great strategy to focus on prior to completing the next couple of tasks as students are developing their mental math and rounding. To use this strategy, students may easily adjust one or both numbers by adding or subtracting amounts to make the numbers "friendly". Most students are comfortable adding in multiples of 10, so this strategy is quite efficient. For example, if presented with 39 + 27 =, the student may add one to 39 to make 40 and add 40 + 27 to get 67 and subtract one to get the final sum of 66. Number strings such as these, can be easily created.

40 + 30
39 + 29
38 + 28
38 + 29
49 + 16

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Game Instructions (SMP 1, 2, 3, 5, and 6)

1. Player 1 will toss all three number cubes and make the GREATEST possible 3-digit number with those digits.
2. Player 1 will write his or her number on his or her recording sheet.
3. The player with the GREATEST number in that round will round his or her number to the nearest hundred and record the rounded number in the total column on their recording sheet.
4. All other players will not record a number in the total column for this round.
5. Play will continue for ten rounds.
6. The winner is the player with the greatest total.

7. At the end of the game, students should share their efficient rounding strategies with one another.

FORMATIVE ASSESSMENT QUESTIONS

- How did you determine the greatest number?
- How did you determine which hundred your number was closest to?
- What strategy did you use to determine who won?

DIFFERENTIATION

Extension

- Have students create anchor charts for efficient rounding strategies.
- Have students practice rounding to the nearest ten with three dice.
- Have students try rounding to the nearest thousand with four dice.

Intervention

- Students can use number lines or hundreds charts to help them.
- Students can play with two cubes instead of three, rounding to the nearest ten.
- Students can complete the task with a teacher or peer assistant.

Intervention Table

"The Great Round Up!"

Game Instructions and Recording Sheet

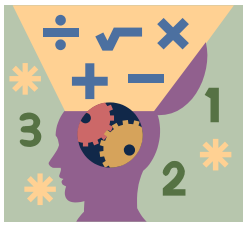
1. Player 1 will toss all three number cubes and make the GREATEST possible 3-digit number with those digits.
2. Player 1 will write his or her number on his or her recording sheet.
3. The player with the GREATEST number in that round will round his or her number to the nearest hundred and record the rounded number in the total column on their recording sheet.
4. All other players will not record a number in the total column for this round.
5. Play will continue for ten rounds.
6. The winner is the player with the greatest total.
7. At the end of the game, students should share their efficient rounding strategies with one another.

ROUND	GREATEST 3-DIGIT NUMBER	ROUNDED NUMBER
example round	432	400
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
		TOTAL

ROUND	GREATEST 3-DIGIT NUMBER	ROUNDED NUMBER
example round	432	400
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
		TOTAL

CONSTRUCTING TASK: MENTAL MATHEMATICS

Back to Task Table



(*Due to the amount of discussion involved in this task, it can easily take more than one class session.)* This task builds on the idea of various mental math strategies that could easily be addressed in Number Talks throughout the year.

CONTENT STANDARDS

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

The standard algorithm does not allow students to explore a variety of useful approaches based on place value and properties of operations. Many students have picked up standard algorithms from family members or older friends, causing them to resist more flexible thinking. Discussions should go beyond whether or not the answers are correct, but why (Teaching Student Centered Mathematics, 2014, John, A. Van de Walle, Karen S. Karp, LouAnn H Lovin, and Jennifer M. Bay-Williams). The goal here is to develop efficient ways to group numbers and/or develop compensation strategies for mental addition and subtraction. The value of group discussions and modeling is evident when students gather insights from their classmates that will reinforce basic number sense and develop strategies that will help them become better at mental computation.

Throughout the year, this type of task is a valuable opening activity and should be revisited frequently. When using mental math problems as an opening activity, focus on the strategies students use to find the solution.

Students should be encouraged to solve problems in ways that make sense to them. If students have never been encouraged to solve problems mentally and share their own strategies with others, they may be reluctant to share or may feel that their strategy is inappropriate. Establish ground rules in your classroom about sharing ideas and how students can appropriately respond to each other.

Students should have some prior experiences with basic computation strategies allowing them to calculate quickly and reliably. Examples include counting on, doubling, making tens, making hundreds, and using benchmark numbers.

COMMON MISCONCEPTIONS

If students have been previously exposed to the standard algorithm, when asked to compute math mentally, they will typically perform the standard algorithm mentally instead of using an invented strategy. A way to solve this issue is to always ask students to explain how they solved the problem and why it worked.

ESSENTIAL QUESTIONS

- How is mental math useful?
- How can we select among the most useful mental math strategies for the task we are trying to solve?

MATERIALS

- Chalkboard, whiteboard, overhead projector, or Interactive Whiteboard
- "Mental Mathematics" Recording Sheet

GROUPING

Whole Class/Small Group Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students will engage in mental math activities and rich group discussions about various strategies used to find the answers to addition and subtraction problems without paper and pencil.

Task Directions (Part 1 could be utilized for Number Talks spanning several days)

Part I (SMP 1, 2, 3, 6, 7, and 8)
Begin this activity by placing one problem at a time on the board, preferably horizontally. Be aware that students may initially need individual time to solve these problems mentally, so encourage students to be patient and quiet during this time. Below is a number string that encourages doubling, making tens and hundreds. After allowing enough time for students to consider the problem, lead a discussion by asking several students to share their solution and/or strategy. Simply stating an answer is not enough to make this a rich activity. Encourage students to share different strategies, asking them to try to make sense of each solution as it is presented. Remind students that the goal is to become **efficient** and **flexible** in their thinking and strategies.

Doubling	Making Tens	Making Hundreds
30 + 30	**7 + 3 + 8 + 2**	**40 + 60**
29 + 29	**6 + 1 + 4 + 9**	**70 + 30**
29 + 28	**5 + 2 + 8 + 5**	**80 + 20**
29 + 30	**7 + 3 + 3 +7**	**10 + 90**
60 - 30	**17 + 14**	**71 + 29**
60 -31	**18 + 13**	**65 + 35**
60 - 29	**19 + 11**	**60 +30 +40 + 70**
60 - 32	**15 + 25**	**75 +25 +15 +85**

Part II (SMP 1, 2, 3, 6, 7, and 8)
Below is a number string that encourages leaps of 10:

Leaps of 10 forward	Leaps of 10 backwards
26+10	36-10
26+12	36-20
26+22	36-24
44+30	43-30
44+39	43-39
58+21	57-21
63+29	65-39

Part III (SMP 1, 2, 3, 6, 7, and 8)
Solve the following problems as they are placed on the board using no paper or manipulatives. Use your mental math strategies. Be prepared to share your solutions and strategies.

- 150 + 70
  Students may solve this problem in a variety of ways. Examples are:
  - 150 + 50 is 200 and 20 more is 220.
  - 50 + 70 is 120 and 100 more is 220.
  - 100 + 70 is 170, 30 more is 200 and 20 more is 220.
- 240 + 160
  Students may solve this problem in a variety of ways. Examples are:
  - 200 + 100 is 300 and 40 + 60 is 100, so 300 + 100 is 400.

  - 40 + 60 is 100 and 200 + 100 is 300, so 100 + 300 is 400.
  - 240 + 60 is 300 and 100 more is 400.
- 690 + 170
  Students may solve this problem in a variety of ways. One example is:
  - 690 and 10 more is 700, 700 + 170 is 870, but take 10 away that was added to the 690 to get 700, so the answer is 860.
  - Some may attempt a traditional algorithm, but should notice that this is more cumbersome than examining the numbers and using the part-whole mental reasoning strategies (like the one above) to compute.

- 500 - 120
  Students may solve this problem in a variety of ways. Examples are:
  - 500 – 100 is 400, then 400 – 20 is 380.
  - 500 – 20 is 480, them 480 – 100 is 380.
  - You need 80 more to get to 200 from 120, then 300 more to get to 500, so the answer is 80 + 300 or 380. Note: Students who use this method are actually finding the *difference* between the two numbers and not simply "taking away." This is a wonderful opportunity to discuss different approaches to subtraction.

If students are struggling with this task, encourage the use of an empty number line until they are able to visualize the leaps of ten.

FORMATIVE ASSESSMENT QUESTIONS

- What is the most efficient strategy that you have found?
- How can you verify your solution?
- Could this problem be solved another way? How?

DIFFERENTIATION

Extension (SMP 1, 2, 3, 4, 6, 7, and 8)

- When you are presenting problems to students, vary the problems you use. Include various operations and numbers.
- Require students to show at least two ways to solve the problems, recording the strategies in their journals or on chart paper to share.
- Increase the numbers to help students transfer the part-whole strategies to solve more complex problems

Intervention (SMP 1, 2, 3, 4, 6, 7, and 8)

- Have students work with smaller, single-digit numbers initially.
- Have students use Rekenreks, number lines, or other tools to help them conceptualize their mental math strategies. (SMP 4 and 5)
- Have students work with a partner to develop strategies.

- Students who struggle with math reasoning often have difficulty communicating their thinking. Extra sensitivity and encouragement must be shown for these students as they develop and strengthen these sets of process skills. Questioning can scaffold students who are challenged by discussing their math thinking.

Intervention Table

TECHNOLOGY CONNECTION

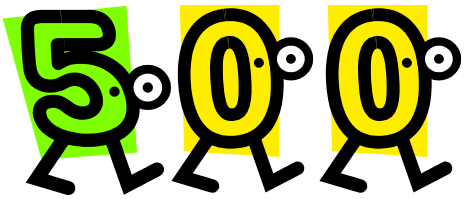
- https://apps.mathlearningcenter.org/number-line/ - Number Line App to help students interact with a digital tool to make sense of the numbers and quantities

Name _____ Date _____

Mental Mathematics

When your teacher gives you mathematics problem, solve it using mental mathematics and then record your thinking in the correct box below. During student sharing, if you like a strategy used by another student, record it in the same box.

Problem #1	**Problem #2**
Problem #3	**Problem #4**



CONSTRUCTING TASK: PERFECT 500!

Back to Task Table

This task involves estimation with addition. It utilizes many mental math strategies developed in number talks and prior tasks.

CONTENT STANDARDS

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students should have addition skills clearly in place, and strategies for larger numbers, including counting up, counting back, pairs that make ten, pairs that make 100, and compensation strategies.

Students may find this game challenging, particularly at the beginning of the year. When introducing this game, you may choose to use one of the variations of the game from the list below.

- Play just one round, the students with the sum closest to 100 wins.
- Play just one round as a class. Put the digits on the board and let students create the sum that is closest to 100.
- Discuss the relationship between pairs of 10 and pairs of 100. (i.e. 4 + 6 = 10, so 40 + 60 = 100 What about 42 + 68? Why doesn't that equal 100?

COMMON MISCONCEPTION

The use of terms like "round up" and "round down" confuses many students. For example, the number 37 would round to 40 or they say it "rounds up". The digit in the tens place is changed from 3 to 4 (rounds up). This misconception is what causes the problem when applied to rounding down. The number 32 should be rounded (down) to 30, but using the logic mentioned for rounding up, some students may look at the digit in the tens place and take it to the previous number, resulting in the incorrect value of 20. To remedy this misconception, students need to use a number line to visualize

the placement of the number and/or ask questions such as: "What multiples of ten are 32 between and which is it closer to?" Developing the understanding of what the answer choices are before rounding can alleviate much of the misconception and confusion related to rounding. (Adapted from Ohio Department of Education Model Curricula)

ESSENTIAL QUESTIONS

- What strategies will help me add numbers quickly and accurately?
- What strategies are helpful when estimating sums in the hundreds?

MATERIALS

- Deck of game cards, (2 copies of the cards provided for a deck of 40 cards)
- "Perfect 500" Directions Sheet
- "Perfect 500" Student Recording Sheet

GROUPING

Partner/Small Group Game

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

In the previous task, Part I provided several addition strategies. The number string examples there support this task as well.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

This game allows students to look for combinations of numbers that equal 100.

Task Directions (SMP 1, 2, 6, 7, and 8)

The goal of the game is to have a sum as close to, but not over, 500 at the end of five rounds. To begin, each student is dealt 5 cards. The player uses four of the cards to make 2, two-digit numbers, saving the unused card for the next round. Each player tries to get as close as possible to 100. Students record their addition problem on the recording sheet, keeping a running total as they play.

For the second round, each player gets four cards to which they add the unused card from the first round. The student, who is closest to 500 without going over, after five rounds, is the winner.

FORMATIVE ASSESSMENT QUESTIONS

- What is one way to quickly find the answer? Can you think of another way?
- What strategies would you use to be sure you don't go over 500?
- How do you decide which numbers to use? How do you choose which cards to use?

DIFFERENTIATION

Extension

- Students can play "Perfect 5,000" during which each player draws 7 cards and uses 6 to make 2, three-digit numbers whose sum is close to 1,000. After 5 rounds, the player with the sum closest to 5,000 without going over is the winner.

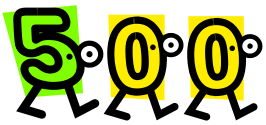
Intervention

- Plan for students with like abilities to play against each other.
- Students can play "Perfect 100" during which each player draws 4 cards and adds the numbers on three cards to find a sum as close as possible to 20. After 5 rounds, the player with the sum closest to 100 without going over is the winner.
- Students who need a visual can use manipulatives such as base ten blocks, snap cubes, drawings, etc. (SMP 4 and 5)

Intervention Table

Name _____ Date _____

Perfect 500



Number of Players: 2 or 3
Materials: One deck of 40 cards (4 each of the numbers 0-9)

Directions:

1. The goal of the game is to have a sum as close to but not over 500 at the end of five rounds.
2. To begin, shuffle the deck of cards.
3. Deal 5 cards to each player. Use four of the cards to make 2, two-digit numbers, saving the fifth card for the next round.
4. Try to get as close as possible to 100. Record your addition problem and sum on the recording sheet, keeping a running total as you play.
5. For the second round, each player gets four cards to which they add the unused card from the first round.
6. After five rounds, the winner is the player who is closest to 500 without going over.

Perfect 500!

Player 1 _____ **Date _____**

Round						Running Total
1		+		=		
2		+		=		
3		+		=		
4		+		=		
5		+		=		
					Total	

Player 2 _____ **Date _____**

Round						Running Total
1		+		=		
2		+		=		
3		+		=		
4		+		=		
5		+		=		
					Total	

CONSTRUCTING TASK: TAKE 1,000

Back to Task Table

This task involves estimation with addition. It utilizes many mental math strategies developed in number talks and prior tasks.

CONTENT STANDARDS

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

ESSENTIAL QUESTIONS

- How can I learn to quickly calculate sums in my head?
- What strategies will help me add multiple numbers quickly and accurately?

MATERIALS

- A deck of cards containing two of each of the following numbers: 100, 200, 300, 400, 500, 600, 700, 800, 900, 500, 50, 950, 150, 850, 250, 750, 350, 650, 450, 550. (Copy 2 game cards sheets for each deck of cards)
- "Take 1,000 Game, Student Directions" Student Sheet

GROUPING

Partner/Small Group.

BACKGROUND KNOWLEDGE

Students should have had practice developing strategies to make combinations of ten and one hundred using mental math. They can apply those strategies to finding sums to one thousand.

COMMON MISCONCEPTIONS

While quickly computing, students may confuse place value while adding and subtracting mentally. One way to address this misconception is to discuss the value of the numbers on the cards prior to playing to game.

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

By this time, Number Talks should be a part of your daily routine. For additional help with strategy development with addition and subtraction visit chapter 5 and 6 in *Number Talks: Helping Children Build Mental Math and Computation Strategies* by Sherry Parrish (2010).

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

This is a card game during which students must be the first to spot combinations of one thousand. This game can be adapted to eliminate the speed aspect to the game. Students can take turns turning over a card and placing it face up next to the other cards that are face up. If there is a sum of the numbers on any pair of cards that equals 1,000 the student gets to take those cards. If there is not a sum of 1,000, then the cards are left face up and the student's turn ends. Play continues until all of the cards have been turned over. The player with the most cards at the end of the game wins. As students play, ask them to record their pairs of 1,000 as an addition number sentence. This gives students an opportunity to focus on the pairs that make 1,000 and provides a record of the game.

Task Directions (SMP 1, 2, 3, 6, 7, and 8)
Students follow the directions below from the "Take 1,000 Game, Student Directions" Student Sheet.
Number of Players: 2
Materials: Deck of 40 Cards

Directions:

1. Your goal in this game is to make sets of one thousand.
2. Shuffle the cards well and lay them face down in a pile on the desk.
3. Turn the top card over and set it to the side where both partners can see it. Now turn the next card over and set it to the side of the first overturned card.
4. If the first two overturned cards equal one thousand when added together, try to be the first one to say, "One Thousand!" loudly enough for your partner to hear you. This student should prove answer by adding numbers out loud. First to notice a sum of 1,000 takes the cards.
5. If the first two cards do not make a set of one thousand, keep turning cards over and setting them next to the first overturned cards. When someone spots a combination of one thousand, they call out "One Thousand!" and the take the cards that total one thousand. Before student takes the cards, they should prove their answer by adding numbers out loud. Keep playing until all cards have been claimed or the overturned cards do not make a set of one thousand.
6. The player with the most cards at the end of the game is the winner.

FORMATIVE ASSESSMENT QUESTIONS

- What do you know about pairs of numbers that add to 1,000?
- What strategies are you using? How are they working for you?
- What can you do to find the answer quicker than your partner?
- Does 630 + 470 equal 1,000? How do you know?

DIFFERENTIATION

Extension

- Ask students to make cards to add to the deck of cards. Provide blank card outlines and allow students to either create their own pairs of 1,000 cards to the deck or to create their own deck of cards with which to play the game. (SMP 5)

Intervention

- If two struggling students are going to play this game together, it may help to model the game during small group instruction first. While modeling the game, use the think-aloud strategy to model ways students can think about pairs to one thousand.
- Play a "Pairs to 100" game. Cards and directions can be found in Unit 6, Grade 2 frameworks. Or play a "Pairs to 20" game using two of each of the following cards: 1, 19, 2, 18, 3, 17, 4, 16, 5, 15, 6, 14, 7, 13, 8, 12, 9, 11, 10, 10.

Intervention Table

TECHNOLOGY

- http://letsplaymath.wordpress.com/tag/mental-math/ Offers ideas for other games and links to additional math sites.

50	100	150	200
250	300	350	400
450	500	550	600
650	700	750	800
850	900	950	500

Name _____ Date _____

Take 1,000

Number of Players: 2
Materials: Deck of 40 Cards

Directions:

1. Shuffle the cards well and lay them face down in a pile on the desk.
2. Turn the top card over and set it to the side where both partners can see it. Now turn the next card over and set it to the side of the first overturned card.
3. Your goal in this game is to make sets of one thousand.
4. If the first two overturned cards equal one thousand when added together, try to be the first one to say, "One Thousand!" loudly enough for your partner to hear you. You should prove your answer by adding numbers out loud. If you are first to notice, you may take the cards that equal one thousand. If your partner is the first to notice, he or she gets to take the cards.
5. If the first two cards do not make a set of one thousand, keep turning cards over and setting them next to the first overturned cards. When someone spots a combination of one thousand, they call out "One Thousand!" and take the cards that total one thousand. Before anyone takes the cards, they must prove their answers out loud. Keep playing this way until all cards have been claimed or the overturned cards do not make a set of one thousand.
6. The player with the most cards at the end of the game is the winner.

3-ACT TASK: PIGGY BANK

Back to Task Table

In this task, students will view a video and tell what they noticed. Next, they will be asked to discuss what they wonder about or are curious about. Students will then use mathematics to answer their own questions.

APPROXIMATE TIME: 1 class period

CONTENT STANDARDS

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

STANDARDS FOR MATHEMATICAL PRACTICE

1. **Make sense of problems and persevere in solving them.** Students must make sense of the problem by identifying what information they need to solve it.
2. **Reason abstractly and quantitatively.** Students are asked to make an estimate (high and low).
3. **Construct viable arguments and critique the reasoning of others.** After writing down their own questions, students discuss their question with partners, creating the opportunity to construct the argument of why they chose their question, as well as critiquing the questions that others came up with.
4. **Model with mathematics.** Once given the information, the students use that information to develop a mathematical model to solve their question.
5. **Use appropriate tools strategically.** Students write their best estimate and two more estimates – one that is too low and one that is too high to establish a range in which the solution would occur.
6. **Attend to precision.** Students use clear and precise language when discussing their strategies and sharing their own reasoning with others.
7. **Look for and make sense of structure.** Students use their understanding of properties of operations as strategies to help them add and subtract large numbers.

ESSENTIAL QUESTIONS

In order to maintain a student-inquiry-based approach to this task, it may be beneficial to wait until Act 2 to share the EQ's with your students. By doing this, students will be allowed the opportunity to be very creative with their thinking in Act 1. By sharing the EQ's in Act 2, you will be able to narrow the focus of inquiry so that the outcome results in student learning directly related to the content standards aligned with this task.

- How can we effectively estimate numbers?
- What strategies can I use to solve real world problems?
- How can I use what I understand about addition and subtraction in word problems?

MATERIALS

- Act 1 video- https://vimeo.com/91754671
- Picture of coin totals/total amount of money (Act 3)
- Student recording sheet

GROUPING

Individual/Partner and or Small Group

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students will view the video (https://vimeo.com/91754671) and tell what they noticed. Next, they will be asked to discuss what they wonder about or are curious about. These questions will be recorded on a class chart or on the board and on the student recording sheet. Students will then use mathematics to answer their own questions. Students will be given information to solve the problem based on **need**. When they realize they don't have the information they need, and ask for it, it will be given to them.

BACKGROUND KNOWLEDGE:

This task follows the 3-Act Math Task format originally developed by Dan Meyer. More information on this type of task may be found at http://blog.mrmeyer.com/category/3acts/. A Three-Act Task is a whole-group mathematics task consisting of 3 distinct parts: an engaging and perplexing Act One, an

information and solution seeking Act Two, and a solution discussion and solution revealing Act Three. More information along with guidelines for 3-Act Tasks may be found in the ***Guide to Three-Act Tasks*** on georgiastandards.org.

COMMON MISCONCEPTIONS:

Students who lack place value understanding may add and subtract without regard to place value. Encourage students to use strategies based on place value, properties of operations, and the relationship between addition and subtraction as shown in previous tasks.

According to research, students will develop many different strategies for addition and subtraction. As a teacher, you will want to make sure that students have at least 2 efficient, mathematically correct, and useful strategies that can be used with various numbers. Number Talks are a great way to develop these strategies and is a forum for sharing these amongst their peers. Refer to previous tasks as well as the math maintenance section in the Grade Level Overview for possible activities to provide students with opportunities to build these strategies.

It is not unreasonable for third grade students to mentally add and subtract two-digit numbers, however you must not push all students to pure mental computation. (Van De Walle, Teaching Student Centered Mathematics, Vol. I, p. 108)

Task Directions:

Act 1 – Whole Group - Pose the conflict and introduce students to the scenario by showing Act I video. **(Dan Meyer** http://blog.mrmeyer.com/2011/the-three-acts-of-a-mathematical-story/**)**

"Introduce the central conflict of your story/task clearly, visually, viscerally, using as few words as possible."

- Show Act 1 video (https://vimeo.com/91754671) to students.
- Ask students what they noticed in the video, what they wonder about, and what questions they have about what they saw in the video. Do a think-pair-share so that students have an opportunity to talk with each other before sharing questions with the whole group. Students may need to watch the video several times.
- Share and record students' questions. The teacher may need to guide students so that the questions generated are math-related.

Anticipated questions students may ask and wish to answer: (*Main question(s) to be investigated)

- How much money was in the piggy bank?
- *How many coins were in the piggy bank?
- How many pennies/nickels/dimes/quarters were in the bank?

- *How many more _____ (any coin) are there than _____ (any coin)?

- Once students have their question, ask the students to estimate answers to their questions (think-pair-share). Students will write their best estimate, then write two more estimates – one that is too low and one that is too high so that they establish a range in which the solution should occur. Students should plot their three estimates on an empty number line. Note: As the facilitator, you may choose to allow the students to answer their own posed questions, one question that a fellow student posed, or a related question listed above. For students to be completely engaged in the inquiry-based problem-solving process, it is important for them to experience ownership of the questions posed.

Important note: Although students will only investigate the main question(s) for this task, it is important for the teacher to not ignore student generated questions. Additional questions may be answered after they've found a solution to the main question, or as homework or extra projects.

Act 2 – **Student Exploration** - Provide additional information as students work toward solutions to their questions. **(Dan Meyer** http://blog.mrmeyer.com/2011/the-three-acts-of-a-mathematical-story/**)**

"The protagonist/student overcomes obstacles, looks for resources, and develops new tools."

- During Act 2, students decide on the facts, tools, and other information needed to answer the question(s) (from Act 1). When students decide what they need to solve the problem, they should ask for those things. It is pivotal to the problem-solving process that students decide what is needed without being given the information up front.

- Required Information:
  94 quarters

  135 dimes

  115 nickels

  470 pennies

- Some groups might need scaffolds to guide them. The teacher should question groups who seem to be moving in the wrong direction or might not know where to begin. Questioning is an effective strategy that can be used, with questions such as:
  - What is the problem you are trying to solve?
  - What do you think affects the situation?
  - Can you explain what you've done so far?
  - What strategies are you using?
  - What assumptions are you making?
  - What tools or models may help you?
  - Why is that true?

Act 3 – Whole Group – Share solutions and strategies.

- Students to present their solutions and strategies and compare them.
- Reveal the solution in Act 3 picture.
- Lead discussion to compare these, asking questions such as:
    - How reasonable was your estimate?
    - Which strategy was most efficient?
    - Can you think of another method that might have worked?
    - What might you do differently next time?

Act 4, The Sequel - "The goals of the sequel task are to a) challenge students who finished quickly so b) I can help students who need my help. It can't feel like punishment for good work. It can't seem like drudgery. It has to entice and activate the imagination." Dan Meyer
http://blog.mrmeyer.com/2013/teaching-with-three-act-tasks-act-three-sequel/

For Act 4, share ideas below or reference other student-generated questions that could be used for additional classwork, projects or homework.

Examples:

- If all of the coins in the piggy bank were nickels, how would it affect the total amount of money in the piggy bank? What would the monetary difference be?
- Would you rather have 135 dimes and 115 nickels or 120 dimes and 160 nickels?

FORMATIVE ASSESSMENT QUESTIONS

- What models did you create?
- What organizational strategies did you use?

DIFFERENTIATION

Extension

- Provide students with a dollar amount and ask them to find different combinations of coins that could total to that dollar amount.

Intervention

- Allow students to use counters or similar manipulatives to model the coin amounts.

Intervention Table

Act 3 Reveal Picture:

Task Title: _____ Name: _____

Adapted from Andrew Stadel

ACT 1

What did/do you notice?
What questions come to your mind?

Main Question: _____

What is your 1st estimate and why? On an empty number line, record an estimate that is too low and an estimate that is too high.

ACT 2

What information would you like to know or need to solve the MAIN question?

Record the given information (measurements, materials, etc…)

If possible, give a better estimation with this information: _____

Act 2 (con't)

Use this area for your work, tables, calculations, sketches, and final solution.

ACT 3

What was the result?

SCAFFOLDING TASK: "LET'S THINK ABOUT ADDITION AND SUBTRACTION"

Back to Task Table

Adapted from North Carolina's Core Essentials Mathematics Program
In this task, students will solve word problems requiring addition and subtraction.

CONTENT STANDARDS

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

According to research, students will develop many different strategies for addition and subtraction. As a teacher, you will want to make sure that students have at least 2 efficient, mathematically correct, and useful strategies that can be used with various numbers. Number Talks are a great way to develop these strategies and is a forum for sharing these amongst their peers. Refer to previous tasks that include Number Talk activities. Using these, as well as others, encourages student development of alternative computational strategies.

It is not unreasonable for third grade students to mentally add and subtract two digit numbers, however you must not push **all** students to pure mental computation. (Van de Walle, Teaching Student Centered Mathematics, Vol. I, p. 108)

COMMON MISCONCEPTIONS

Students who lack place value understanding may add and subtract without regard to place value. Encourage students to use strategies based on place value, properties of operations, and the relationship between addition and subtraction as shown in previous tasks.

ESSENTIAL QUESTIONS

- How can I use addition and subtraction to solve real world problems?
- What strategies can I use to solve real world problems?
- How are addition and subtraction related?

MATERIALS

- Math Journals (or paper)
- Manipulatives/cut outs (to help students create models for their problems)
- "Let's Learn About Addition and Subtraction" recording sheet

GROUPING

Students may be grouped individually, in pairs, or in small groups at the teacher's discretion.

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

By this time, Number Talks should be a part of your daily routine. For additional help with strategy development with addition and subtraction visit chapter 5 and 6 in *Number Talks: Helping Children Build Mental Math and Computation Strategies* by Sherry Parrish (2010).

25 + 27 =	Decompose 27 to 25 + 2 25 + 25 = 50 and 50 + 2 = 52	20 + 20 = 40 Then 40 + 12 = 52
99 + 99 =	100 + 100 = 200 Then 200 - 2 = 198	90 + 90 = 180 Then 180 + 18 = 198

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Although addition and subtraction were covered in 2nd grade, students can still benefit from acting the stories out. Students should use pictures, words and numbers to solve the word problems.

Part I (SMP 1, 2, 3, 4, 6, 7)
The teacher will begin by asking students to respond to the following questions in their math journal. Shabina sorted the change in her piggy bank. She has 122 pennies, 97 nickels, 118 dimes, and 308 quarters. How many coins did Shabina sort in all?

Once students are finished, the class will discuss the strategies they used to determine the answer. There should also be discussion about how subtraction could be used to verify results. This information may also be used to create an anchor chart.

Part II (SMP 1, 2, 3, 4, 6, 7, 8)
Although students are not formally introduced to decimals in the standards until 4th grade, it is acceptable and developmentally appropriate for students to encounter these life skills by adding and

subtracting dollars and cents in 3rd grade. Students should not be expected to add and subtract decimals out of this context.

In small groups, students will complete the "Figuring Out Addition and Subtraction" recording sheet. Students should be encouraged to solve their problems in multiple ways, using pictures, numbers, and words.

- Your school cafeteria sells popsicles for seventy-five cents, nutty buddies for eighty-five cents, and ice cream cones for sixty cents. If a student spends ten dollars in the month of October for these treats, what could the student have bought? List as many combinations as you can find.
- Roberto is saving for a computer that cost $750. He received $123 for his birthday in May and saved $347 from cutting grass during June and July. How much money does Roberto still need to purchase the computer?

FORMATIVE ASSESSMENT QUESTIONS

- Explain one strategy that can be used when adding?
- Explain one strategy that can be used when subtracting?
- What strategies can be used to solve real world problems accurately?
- How are addition and subtraction related?

DIFFERENTIATION

Extension

- The four 3rd grade classes sold 527 bracelets for a fundraiser. Each class sold at least 115 bracelets. No class sold the same amount of bracelets. Class 1 sold more bracelets than any other class. What different combinations of bracelets could have been sold by each class?
- Draw a bullseye or target. Label each circular area with the following values: 12, 13, 14, 15. Imagine this situation and solve the problem below.
-

Five darts were thrown at the target and it was hit each time. One number was hit twice and another was hit three times. The total score was 66. Which numbers were hit? What scores other than 66 were possible?

Intervention

- Students may use manipulatives such as counters or money.
- Adjust the numbers in the task. If students are struggling with the idea of money, discuss everything in the context of pennies within 1000 ($10.00)

Intervention Table

Name_____ Date _____

Let's Think Addition and Subtraction!

***Try to solve each problem in more than one way using pictures, numbers, and words.**

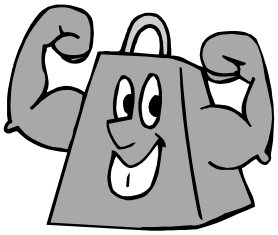
Your school cafeteria sells popsicles for seventy-five cents, nutty buddies for eighty-five cents, and ice cream cones for sixty cents. If a student spends ten dollars in the month of October for these treats, what could the student have bought? List as many combinations as you can find.

Roberto is saving for a computer that cost $750. He received $123 dollars for his birthday in May and saved $347 dollars for cutting grass during June and July. How much money does Roberto still need to purchase the computer?

CONSTRUCTING TASK: THE POWER OF PROPERTIES

Back to Task Table

This task builds on the relationship of addition and subtraction by developing the understanding of the properties of operations.



CONTENT STANDARDS

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction**.**

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

"In grades 3 through 5, students apply the properties of addition and the properties of multiplication as they learn basic facts and computational strategies. For example, understanding the commutative property for both addition and multiplication substantially reduces the number of facts to be memorized (Teaching Student Centered Mathematics Volume 2, p. 300 Van de Walle 2014)" Starting in first grade students begin generalizing addition and subtraction by exploring the properties. This standard goes beyond simply memorizing properties of operations; students are expected to use this understanding to solve problems (Van de Walle, 2014).

COMMON MISCONCEPTIONS

Most children find it easy to understand the commutative property of addition and the identity property of addition, especially if they have seen them modeled and tried them themselves many times with manipulatives. Some areas where students may have more difficulty are listed below.

- For subtraction, there is no commutative property and no associative property.
- The number "zero" should not be referred to as (the letter) "O" since this will cause confusion when working with variables.
- It is important that students first simplify what is inside the parentheses when using the associative property.

Be careful about making an inaccurate statement such as, "You cannot subtract a greater number from a smaller number." It is possible to subtract a greater number from a smaller number; however, the result is a negative number. You want students to have access to correct mathematical information, even though they will not study positive and negative numbers until middle school. Therefore, you might say, "You cannot take away 12 pennies when you only have 8 pennies." Or use a similar example with concrete materials.

ESSENTIAL QUESTIONS

- How does knowing the properties of operations help us add and subtract numbers easily?
- How is zero different from any other whole number you might add or subtract?

MATERIALS

- Counters (i.e., connecting cubes, cardboard cutouts, beans, or paper clips)
- Student Math Journals
- "The Power of Properties" Recording Sheet

GROUPING

Individual/Partner Task

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

By this time, Number Talks should be a part of your daily routine. For additional help with strategy development with addition and subtraction visit chapters 5 and 6 in *Number Talks: Helping Children Build Mental Math and Computation Strategies* by Sherry Parrish (2010).

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION (SMP 1, 2, 3, 4, 5, 6, 7, and 8)

In this task, students will use counters to demonstrate various addition properties and explore these properties with subtraction. Begin by writing $5 + 6 = 6 + 5$ on the board and ask students if this statement is true or false. After all students are able to confidently state that this is a true statement ask, "Is this true for any two numbers? Can you find a situation where this does not work? Prove it." Give students time to investigate with counters or any useful manipulative to investigate this property. Students should record investigations in their journal. Only after students have had ample time to investigate, inform them that this is called the Commutative Property of Addition and title their journal work as this property.

Write $(8 + 2) + 3 = 8 + (2 + 3)$ on the board and ask students if this statement is true or false. After all students are able to confidently state that this is a true statement ask, "Is this true for any group of

numbers? Can you find a situation where this does not work? Prove it." Give students time to investigate this property and record investigations in their journals. After students have worked through the task, use their discoveries to explain the Associative Property of Addition and use this to label the journal page.

On the board, write 13 + 0 = 13 and ask students if this statement is true or false. After all students are able to confidently state that this is a true statement ask, "If you add zero to a number, will it ALWAYS be that number? Can you find a situation where this does not work? Prove it." Allow time for students to investigate this task until they can not only state that this always works, but can explain why it always works. Use this discussion to introduce the Identity Property of Addition.

Pass out the recording sheet for subtraction and pose the following problem to the students: Based on your knowledge of the commutative, associative and identity properties, investigate how that information relates to subtraction. Give students plenty of time to work through this part of the task so that they have a better understanding of subtraction.

FORMATIVE ASSESSMENT QUESTIONS

- What do you notice about the sum of an addition problem if you switch the order of the digits?
- What do you notice about the difference of a subtraction problem if you switch the order of the digits?
- How is understanding the commutative property helpful?
- What happens to a number when you add zero to it?
- What happens to a number when you subtract zero from it?
- How is understanding the identity property helpful?
- What do you notice about the sum of three addends if you change the pair of numbers you add first?
- What do you notice about the difference of three numbers if you change the pair of numbers you subtract first?
- How is understanding the associative property helpful?

DIFFERENTIATION

Extension (SMP 1, 2, 3, 6, 7, and 8)

- Students create story problems that include use of the properties of addition and subtraction.
- Students compute addition problems that involve larger numbers of addends and prove in more than one way, using parenthesis, that the sums are the same.
- Students model the properties with larger numbers.

Intervention (SMP 4 and 5)

- Students draw a picture to go along with their number sentences that will also demonstrate what happened. Pay close attention to how students model the problem. Have them explain their thinking.
- Pose a story problem to students and have them use counters or other manipulatives to model the problem.

An example is:

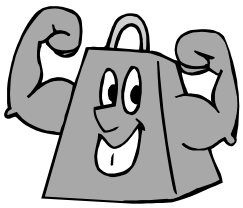
Rashad gave his two sisters some of his chewing gum. He gave Samantha 2 pieces in the morning and 5 pieces after lunch. In the evening, he gave Samantha 8 more pieces of gum.

Rashad gave his other sister, Tina, 8 pieces in the morning and 5 pieces after lunch. Tina said he did not give her as much gum as he gave Samantha because he only gave her 2 pieces that evening. Is Tina correct? Use your mathematical skills to explain whether or not Rashad gave both sisters the same amount of gum.

Intervention Table

TECHNOLOGY CONNECTION
https://learnzillion.com/resources/72372-apply-properties-of-operations-as-strategies-to-multiply-and-divide-3-oa-b-5/ Students practice applying properties of operations to solve problems.

Name _____ Date _____



The Power of Properties

Based on your knowledge of the commutative, associative and identity properties, investigate how that information relates to subtraction.

What About Subtraction?

Use counters to model each property again, this time with subtraction.

Do the properties for addition also work for subtraction? Use words, pictures and numbers to explain what happens for each property.

Commutative Property

Identity Property

Associative Property

PRACTICE TASK: "TAKE DOWN!"

Back to Task Table

In this task, students will use mental math to solve subtraction problems.

CONTENT STANDARDS

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

This task begins to develop subtraction using mental math, which is simply an invented strategy that the students do mentally. Not all students will be able to subtract mentally and are still in the concrete stage of development. Do not force students to compute mentally, it may weaken the developing understanding of those who have not invented strategies or are still in the direct modeling stage. (Van de Walle, p. 103-104)

COMMON MISCONCEPTIONS

Students who lack place value understanding may add and subtract without regard to place value. Encourage students to use strategies based on place value, properties of operations, and the relationship between addition and subtraction as shown in previous tasks.

ESSENTIAL QUESTIONS

- Which strategy have you found to be most efficient when subtracting?

MATERIALS

- Deck of Cards
- "Take Down" Recording Sheet

GROUPING

Students should work with a partner.

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

By this time, Number Talks should be a part of your daily routine. For additional help with strategy development with addition and subtraction visit chapter 5 and 6 in *Number Talks: Helping Children Build Mental Math and Computation Strategies* by Sherry Parrish (2010).

100 - 98 =	Using a number line, count up from 98 to 100 two times	100 - 90 =10 Then 10 - 8 = 2
? - 8 = 15	15 + 8 = 15 + 5 + 3 = 23	15 + 8 = 10 + 5 + 8 = 23

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Provide students with a deck of cards and the "Take Down" Recording Sheet to complete the following task:

Game Instructions (SMP 1, 2, 3, 6, 7, and 8)

1. Remove aces and face cards from a regular deck of cards.
2. Shuffle cards and place deck face down between partners.
3. Players draw two cards each.
4. Using their own two cards, each student forms a two-digit number.
5. Each player subtracts their own two-digit number from 1000 and records the difference on his/her recording sheet.
6. Players continue playing by drawing two new cards, forming their own two-digit number, and subtracting this number from the previous difference.
7. Play continues until one player can no longer subtract a two-digit number.
8. At the end of the game, students convene as a class and share subtraction strategies used while playing the game.

This sharing opportunity lends itself to students creating anchor charts illustrating their subtracting strategies.

DIFFERENTIATION

Extension

- Students could create three digit numbers and subtract from 10,000.

Intervention

- Teacher may reduce the target number.
- Students may play in a non–competitive fashion, where the focus is primarily subtracting to find a difference.
- Provide students with Base 10 blocks to help them with their mental math (SMP 4 and 5)

Intervention Table

Name_____ **Date** _____

"TAKE DOWN!"

Game Instructions

1. Remove aces and face cards from a regular deck of cards.
2. Shuffle cards and place deck face down between partners.
3. Players draw two cards each.
4. Using their own two cards, each student forms a two-digit number.
5. Each player subtracts their own two-digit number from 1000 and records the difference on his/her recording sheet.
6. Players continue playing by drawing two new cards, forming their own two-digit number, and subtracting this number from the previous difference.
7. Play continues until one player can no longer subtract a two-digit number.

1000 GAME	PLAYER #1	PLAYER #2
1		
2		
4		
5		
6		
7		
8		
9		
10		

CONSTRUCTING TASK: HAPPY TO EAT HEALTHY

Back to Task Table

In this task, students use a menu to decide which items to purchase given a specific amount of money to spend.

CONTENT STANDARDS

MGSE3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students will need to be able to use the associative property and other estimating strategies for flexibility with estimating and using fact families to check their work.

This task reinforces important skills beyond just calculating amounts of money. Students will use reasoning, problem solving, checking, and organizing information to find several different solutions.

COMMON MISCONCEPTIONS

Students who lack place value understanding may add and subtract without regard to place value. Encourage students to use strategies based on place value, properties of operations, and the relationship between addition and subtraction as shown in previous tasks.

ESSENTIAL QUESTIONS

- How can I use addition and subtraction to solve real world problems?
- When would I used estimation strategies in the real world?

MATERIALS

- Healthy Snack Pictures
- Healthy Snack Recording Sheets (3 versions)

GROUPING

Individual/Partner

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

By this time, Number Talks should be a part of your daily routine. For additional help with strategy development with addition and subtraction visit chapter 5 and 6 in *Number Talks: Helping Children Build Mental Math and Computation Strategies* by Sherry Parrish (2010).

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Students use a menu to decide which items to purchase given a specific amount of money to spend. This task requires students to estimate and subtract in order to figure out what to buy as they get closer to the target amount.

Task Directions (SMP 1, 2, 3, 4, 6, 7 and 8)

1. Begin by asking students what a healthy snack might consist of.
2. Pass out Student Work Sheet, Healthy Snack List, and Grading Rubric.
3. Go over directions with students.
4. Answer any questions.
5. Allow ample work time.
6. Select groups to share their results, explaining the steps they took to reach their answer.

FORMATIVE ASSESSMENT QUESTIONS

- What is your plan for solving this problem?
- Do you think it's best to start out with less expensive or more expensive items? Why?
- Do you think you can spend exactly $4?
- How are you keeping track of the different combinations you are trying out?
- What strategies have you discovered while trying to solve this problem?
- Which of your three solutions would you probably select in real life? Why?

DIFFERENTIATION

Extension

- Have students choose the designated amount they "found" in their pocket to spend on lunch.
- Have students explain how to "best" spend their money in terms of a balanced lunch.
- Give students the price list and task requirements alone and have them create their own graphic organizer to solve the problem.

Intervention

- Make several copies of the Healthy Snack List for the students to cut apart. This may help students better visualize the amounts they are estimating, adding, and subtracting. (Use task version 3 if students will cut and glue their choices on to the recording sheet.)
- Students who struggle with math problem solving will benefit from the teacher modeling an example of how an answer could be derived.
- Consider providing money for some students to check their work after they determine their combinations. Remember that this task reinforces important skills including reasoning, checking, and organizing information to find several different solutions.

Intervention Table

Name _____ Date _____

Happy to Eat Healthy

(Version 1)

You walk up to the snack counter and dig in your pockets for the change you stuffed in them this morning before heading to the arcade. After carefully counting your change, you discover you have exactly $3.55. Is this enough to buy yourself a healthy lunch?

Find at least three different ways to buy a healthy lunch. Choose your food items, estimate the cost, and see what other items you can still afford. Try to spend as much of your money as you can. Don't worry about sales tax for this activity.

MENU

Baked chips: 45¢	Milk: 86¢
Hot chocolate: 67¢	Frozen yogurt bar: 39¢
Low-fat hot dog: 75¢	Apple: 52¢
Popcorn: 49¢	Raisins: 56¢
Banana: 87¢	Orange: 62¢
Veggie burger: 99¢	Bottled water: 99¢

Combination #1	**Cost of item**	**Estimated Cost (running total)**	**Actual Cost (running total)**
1.			
2.			
3.			
4.			
5.			
6.			

Combination #2	**Cost of item**	**Estimated Cost (running total)**	**Actual Cost (running total)**
1.			
2.			
3.			
4.			
5.			
6.			

Combination #3	**Cost of item**	**Estimated Cost (running total)**	**Actual Cost (running total)**
1.			
2.			
3.			
4.			
5.			
6.			

Name _____ Date_____

Happy to Eat Healthy

(Version 2)

Your mother gave you $3 for lunch. Use the Healthy Snack List to create three different combinations of items that you could purchase. Snack items can be used more than once. Use scratch paper or your journal for math thinking. Then, show your results in the tables below.

Items	Price
Total	

Items	Price
Total	

Items	Price
Total	

Menu

Baked chips: 45¢	Milk: 86¢
Hot chocolate: 67¢	Frozen yogurt bar: 39¢
Low-fat hot dog: 75¢	Apple: 52¢
Popcorn: 49¢	Raisins: 56¢
Banana: 87¢	Orange: 62¢
Veggie burger: 99¢	Bottled water: 99¢

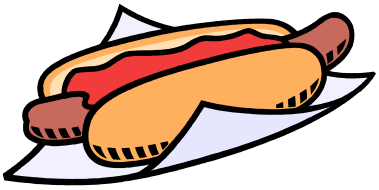
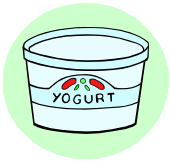
Name _____ Date _____

Happy to Eat Healthy

(Version 3)

1. Cut out the snack items from the Healthy Snack List.
2. Find a combination of 3 or more items that you can purchase with $4.
3. Glue the snack items you chose to the bottom or back of this page. Snack items can be used more than once.
4. Show all of your work.
5. Show your answer in the table below. Be ready to explain how you arrived at your answer.

Items	Price
Total	

Baked Chips 45¢ 	**Milk 86¢** 	**Hot Chocolate 67¢** 
Apple 52¢ 	**Low-fat Hot Dog 75¢** 	**Veggie Burger 99¢** 
Popcorn 49¢ 	**Orange 62¢** 	**Banana 87¢** 
Bottle Water 99¢ 	**Frozen Yogurt Bar 39¢** 	**Raisins 56¢** 

CONSTRUCTING TASK: FIELD DAY FUN

Back to Task Table

In this task, students will solve addition and subtraction word problems.

CONTENT STANDARDS

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

ESSENTIAL QUESTIONS

- When would I use addition and subtraction in a real-world situation?

MATERIALS

- Chart paper, overhead projector, or interactive white board for whole group instruction
- "Field Day Fun" Student Task Sheets

GROUPING

Whole/Small Group/Partner Task

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

By this time, Number Talks should be a part of your daily routine. For additional help with strategy development with addition and subtraction visit chapter 5 and 6 in *Number Talks: Helping Children Build Mental Math and Computation Strategies* by Sherry Parrish (2010).

BACKGROUND KNOWLEDGE

Using contextual problems that students can identify with is significant in the development in students' operation sense. However, teachers need to think about it as more than just giving word problems. We need to give them opportunities to connect these operations to real world settings. Furthermore, Van De Walle cautions us against the use of key words to problem solve. Research states that key words often suggest operations that are incorrect, many problems do not contain key words, and the key word strategy sends the wrong message about mathematics. Van De Walle states, "A student who has been taught to rely on key words is left with no strategy." (Van De Walle, p. 70)

COMMON MISCONCEPTIONS

Students who lack place value understanding may add and subtract without regard to place value. Encourage students to use strategies based on place value, properties of operations, and the relationship between addition and subtraction as shown in previous tasks.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I (SMP 1, 2, and 3)
The teacher will begin with a discussion about a Field Day. The students will talk about the math that they might see through guiding questions such as:

- How do you determine the grade level winners?
- How do you determine who wins a race?
- What do you consider when putting together a relay team?
- How does the egg toss use measurement?

This discussion might lead to other sports and how math is incorporated into them as well. Have students provide examples. This conversation will allow students to think about math outside of "math class".

Part II (SMP 1, 2, 3, 4, and 6)
After the discussion about the use of math on field day, introduce students to the "Field Day Fun" task sheet. Students may complete this task with a partner/small group/or individually. Students should use words, pictures, and numbers to justify their results and thinking. When they have completed all four field day mathematical situations, have students create one of their own field day stories. It may be helpful for students to base their stories on the classroom discussion in Part I. Students may exchange stories and solve.

FORMATIVE ASSESSMENT QUESTIONS

- How did you determine the amount of students who were not in the 3rd grade? Could you have done it another way?
- How did you determine the amount of meters that the relay team still needed to run? Could you have solved it a different way?
- How did you know the amount of money that you needed to borrow from your friend? Can you draw a picture explaining your thinking?

DIFFERENTIATION

Extension

- Students could use their knowledge of other sports to create additional math stories.

Intervention

- Allow students to use number lines or other tools to help them to conceptualize and act out the field day situations. (SMP 4 and 5)

Intervention Table

Name _____ Date _____

Field Day Fun

1. 678 students are participating in field day. There are 98 third graders. How many of them are not third graders?
Show how you know your answer is correct.

2. Each person in the relay race is going to run 200 meters. If there are 4 runners on a team and the third grade team has already run 300 meters, how many meters do they have left to run? Are they on runner #1, #2, #3, or # 4?
Show how you know your answer is correct.

3. Molly wants to buy some cotton candy from the concession stand. She has 27¢, but the cotton candy costs 95¢. How much money does she need to borrow from her friend?

_____ ¢
Show how you know your answer is correct.

4. Time for the award ceremony! There are 476 students there. How many students are they waiting for?

_____ students
Show how you know your answer is correct.

CONSTRUCTING TASK: I HAVE A STORY, YOU HAVE A STORY

Back to Task Table

In this task, students will write their own story problems.

CONTENT STANDARDS

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.

BACKGROUND KNOWLEDGE

Students should be familiar with the concept of solving word problems in math and with seeing symbols for unknowns, such as squares or triangles.

Some students will have difficulty with ____ + 8 = 85 simply because they are so accustomed to seeing a number first. Students need to understand that they may subtract the given number from 85 or count up from 8 to 85 using an empty number line to find the value of the missing number. We also want students to recognize that ___ + 8 yields the same sum as 8 + ___ due to the commutative property of addition. Students need experiences with many different addition problem types. See the examples in the table on page 4 of this unit. Provide students with opportunities to solve a variety of problems presented in varying contexts. Then allow students to write similar stories providing experiences in both creating and solving many types of problems.

COMMON MISCONCEPTIONS

Students who lack place value understanding may add and subtract without regard to place value. Encourage students to use strategies based on place value, properties of operations, and the relationship between addition and subtraction as shown in previous tasks.

ESSENTIAL QUESTIONS

- How can I use what I understand about addition and subtraction in word problems?
- What is a number sentence and how can I use it to solve word problems?

MATERIALS

- White board, overhead projector, or interactive white board for whole group instruction
- "I Have a Story, You Have a Story" recording sheets for small group or cooperative learning groups

GROUPING

Whole/Small Group/Partner Task

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

By this time, Number Talks should be a part of your daily routine. For additional help with strategy development with addition and subtraction visit chapter 5 and 6 in *Number Talks: Helping Children Build Mental Math and Computation Strategies* by Sherry Parrish (2010).

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

When students make up their own number stories, teachers gain insight into the students' understanding of the problem-solving process. Simplify or extend these situations to help students grasp how to solve addition problems with the use of subtraction.

Before students solve the problems in partners or small groups, model the process of solving and writing a similar story problem with the whole class (or rotating with small groups). Use a missing addend problem similar to those on the student sheet.

Task Description (SMP 1, 2, 3, 4, and 6)
Students will solve two story problems and write two similar story problems.

Here is my story:

- The video game store is stocking up on the hottest new game. They already had 127 on the shelf. They just received a new shipment today and now they have 384 copies of the game. How many copies of the game came in today's shipment?
- Now write a similar story about having quarters in your pocket and later finding a hole in your pocket.
  How much money fell through the hole in your pocket? How do you know?

- Here is another story:

  I have 137 marbles in a jar. My brother was playing football in the house and knocked the jar off of the table. I was only able to find 119 marbles. How many are still missing?

  ☐ + 119 = 137

  What number goes in the box? How do you know?
- Write a story for this number sentence:

  56 + ☐ = 190.

  What number goes in the box? How do you know?

FORMATIVE ASSESSMENT QUESTIONS

- How did you use my story to write your story?
- What information will you give in your story? What information needs to be found?
- What strategies did you use to solve the problem? Can you use a different strategy?
- How do you know your answer is correct?

DIFFERENTIATION

Extension

- For the first problem on the student sheet, have students determine the value of the money that fell through the pocket. Also, the stories students create can be extended in a similar manner.
- Have students create their own subtraction stories where the minuend is unknown. (In the subtraction problem 5 – 3 = 2, 5 is the minuend, 3 is the subtrahend, and 2 is the difference.)

Intervention

- Provide a story frame to assist students in organizing and writing a number story.
- Some students may have difficulty with ____ + 8 = 85 simply because they are accustomed to seeing a number first, rather than an unknown quantity. They may need additional experiences with this format to understand that subtracting an addend from the sum will give the remaining addend. Students also should understand that ___ + 8 yields the same sum as 8 + ___ due to the commutative property of addition.
- Provide base ten blocks for students that are struggling and encourage them to role play the scenario. (SMP 5)

Intervention Table

Name _____ Date _____

I Have a Story, You Have a Story

1. Here is my story: The video game store is stocking up on the hottest new game. They already have 127 on the shelf, but they are selling quickly. They just received a new shipment today and now they have 384 copies of the game. How many copies of the game came in today's shipment?	2. Now write a similar story about having a large shipment come into a store.

3. Here is another story: I have 137 marbles in a jar. My brother was playing football in the house and knocked the jar off of the table. I was only able to find 119 marbles. How many are still missing? What number goes in the box? How do you know? □ + 119 = 137	4. Write a story for this number sentence: 56 + □ = 190 What number goes in the box? How do you know?

SCAFFOLDING TASKS: "THE INFORMATION STATION!"

Back to Task Table

Adapted from North Carolina's Core Essentials Mathematics Program. In this task, students will create different graphs after collecting data.

CONTENT STANDARDS

MGSE3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets**.**

MGSE3.MD.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units – whole numbers, halves, or quarters.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning**.**

BACKGROUND KNOWLEDGE

Data and graphing are not isolated concepts. They can and should be integrated with the majority of mathematics. When creating line plots, if students are going to plot their own points, there needs to be a discussion about the importance of keeping the size of the X the same. This should be a discussion as it becomes an issue throughout the task.

COMMON MISCONCEPTIONS

Students may read the mark on a scale that is below a designated number on the scale as if it was the next number. For example, a mark that is one mark below 80 grams may be read as 81 grams. Students realize it is one away from 80, but do not think of it as 79 grams.

Although intervals on a bar graph are not in single units, students count each square as one. To avoid this error, have students include tick marks between each interval. Students should begin

each scale with 0. They should think of skip-counting when determining the value of a bar since the scale is not in single units.

ESSENTIAL QUESTION

- How can data displayed in tables and graphs be used to inform?
- How can graphs be used to compare related data?
- When is it appropriate to use a line plot graph?

MATERIALS

- MATH Journals (or paper)
- Lima Beans
- Magazines and Newspapers
- Rulers or tape measurers

GROUPING

Students may be grouped individually, in pairs, or in small groups, at the teacher's discretion.

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

By this time, Number Talks should be a part of your daily routine. For additional help with strategy development with addition and subtraction visit chapter 5 and 6 in *Number Talks: Helping Children Build Mental Math and Computation Strategies* by Sherry Parrish (2010).

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I (SMP 1, 2, 3, 4, 5, 6, and 7)
The teacher will begin by asking students to complete the following investigation using their math journals:

Survey your classmates, measure, and record the length of their shoes.

The teacher will call the students back together. Collectively, the class will create a line plot graph to display the quantitative data collected in the survey. In their journal, have students write a brief analysis about what they have observed. In groups of 3 or 4, students could develop questions for others to answer.

Part II
In small groups (4 or 5) students will complete the following investigation:

How many lima beans can you pick up in one handful? What about two other classmates?

Students will collect their data in their individual math journals. After the experiment, students will collectively organize their data into a group table on chart paper. They will use their data to create a bar graph.

Part III (may take a few days)
The teacher and students will visit the school parking lot each day for a few days.

- Students should collect information regarding the types or colors of vehicles seen each day in math journals. (This would be a valuable opportunity for the teacher to take his or her own math journal to the parking lot and model using a "think aloud.")
- After a few days, the class will organize the data into a table.
- As a class, the students and teacher will create a pictograph with a scale of 2.
- In small groups, the students will create different pictographs with different scales.
- At the completion of this activity, students will compare their graphs and ask/answer questions about the graphs.

FORMATIVE ASSESSMENT QUESTIONS

- When should you use a line plot to display your data?
- What questions can you answer using your data?
- Was one type of graph easier to create than the other? Why?
- What types of one and two step story problems can you create using your data?
- How can graphs describe observations?

DIFFERENTIATION

Extension (SMP 1, 2 4, 6, and 7)

- Have students create bar graphs and pictographs using alternate scales
- Challenge students to develop a survey question to collect data in which a line plot would be appropriate. Have them to create line plots of their own.
- Try this:
    - Cut out examples of graphs from magazines or newspapers
        - What information is being shown?
        - How would you classify these data displays?
        - Can you determine where the data came from
        -

Intervention (SMP 1, 2, 4, 5, and 6)

- Students may use manipulatives such as counters.
- Work with students in a guided group and assist with thoughtful questioning

Intervention Table

PERFORMANCE TASK: IT'S A DATA PARTY! Back to Task Table

In this task, students will create different graphs after collecting data on different types of party food.

CONTENT STANDARDS:

MGSE3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

In 1st grade students organized, represented and interpreted data up to three categories. Students used collected data to answer questions and solve simple problems. In 2nd grade, students created picture and bar graphs to represent data. Refer to the Unit 1 Overview for grade level appropriate examples for graphs. Students solved simple put-together, take-apart, and compare problems using information presented in graphs. Data and graphing are not isolated concepts. They can and should be integrated with the majority of mathematics.

**Note: Line plot graphs would not be appropriate for this type of data, because it is categorical.

COMMON MISCONCEPTIONS

Students may read the mark on a scale that is below a designated number on the scale as if it was the next number. For example, a mark that is one mark below 80 grams may be read as 81 grams. Students realize it is one away from 80, but do not think of it as 79 grams.

Although intervals on a bar graph are not in single units, students count each square as one. To avoid this error, have students include tick marks between each interval. Students should begin each scale with 0. They should think of skip-counting when determining the value of a bar since the scale is not in single units.

ESSENTIAL QUESTIONS

- How can data be used to make decisions?
- How can data displays be used to describe events?
- How can I analyze data and use what I've learned to answer mathematical questions about it?

MATERIALS

- Paper, markers, crayons, rulers, and other supplies needed to collect data and create graphs
- Chart paper on which to record student data, one for each party challenge (at least 3)

GROUPING

Individual/Small Group Task

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

By this time, Number Talks should be a part of your daily routine. For additional help with strategy development with addition and subtraction visit chapter 5 and 6 in *Number Talks: Helping Children Build Mental Math and Computation Strategies* by Sherry Parrish (2010).

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I – Determine survey criteria (SMP 1, 2, and 6)
Begin this task by engaging the students in a brainstorming session of ideas for what to serve at the data party. Develop choices for five categories, drinks, salty snacks, fruit, desserts, and games. As a class, narrow the lists to 4 choices for each category.

Part II- Collect and display survey data (SMP 1, 2, 3, 5, and 6)
While students will need to work in small groups of 3-5, each group will be assigned a category from Part I. The group should create a recording sheet to use while collecting data. Each group

needs to work collaboratively to survey the class on which choice each student prefers. (All students need to vote.)

After the group has collected the survey data, they then **create** a graph to display their data. Groups should represent the data using a scaled bar graph and a scaled picture graph.

Part III – Analyze and ask questions about your data (SMP 1, 2, 3, 5, and 6)

Students will use their data and graphs to create questions that can be asked about their findings. At least one of the questions should be multistep. They will then exchange their questions with another group member and answer them. Questions should cover the following concepts:

- Joining and Combining (Addition)
- Separating and Comparing (Subtraction)

Part IV- Writing to explain your data (SMP 1, 2, 3, and 6)

Each student should write a letter to the teacher explaining their reasoning for choices that were determined based upon the survey results and supported by their graphs.

FORMATIVE ASSESSMENT QUESTIONS

- What are the ways you can appropriately display categorical data? (i.e. data in categories such as the choices for foods and drink to serve at the party)
- What is an appropriate way to display numerical data?
- Why is it important to include all necessary information in your graph? (i.e. title, labels, scale increments)
- According to the data, what should be served at the data party? How do you know?
- What comparisons can you make using your data as presented in your graph?

DIFFERENTIATION

Extension

- For an additional survey tasks, please see: http://illuminations.nctm.org/LessonDetail.aspx?ID=L243.

Intervention

- Some students may require scaffolding for creating graphs. See the links below for some possible ways to scaffold the creation of graphs.

Intervention Table

TECHNOLOGY CONNECTION

- Graphs can be created using templates such as the pictograph template below: http://www.beaconlearningcenter.com/documents/2351_5255.pdf
- Pictographs can be created using excel following the directions below: http://faculty.kutztown.edu/schaeffe/Excel/Vallone/Vallone_Excel.pdf
- Bar graphs can be created using a website such as:
  - http://nces.ed.gov/nceskids/createagraph/ or
  - http://illuminations.nctm.org/ActivityDetail.aspx?ID=63

CONSTRUCTING TASK: WHAT'S YOUR FAVORITE?

Back to Task Table

Students survey their classmates to collect data and then display the data using pictographs and Venn diagrams.

CONTENT STANDARDS:

MGSE3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

MGSE3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
6. Attend to precision.

BACKGROUND INFORMATION

Students were introduced to Venn diagrams in first grade; however, they focused on two-circle diagrams. This task requires students to create a Venn diagram with three circles. It is important for students to have some experiences with Venn diagrams with three circles before working on this task.

COMMON MISCONCEPTIONS

Students may read the mark on a scale that is below a designated number on the scale as if it was the next number. For example, a mark that is one mark below 80 grams may be read as 81 grams. Students realize it is one away from 80, but do not think of it as 79 grams.

> Although intervals on a bar graph are not in single units, students count each square as one. To avoid this error, have students include tick marks between each interval. Students should begin each scale with 0. They should think of skip-counting when determining the value of a bar since the scale is not in single units.

ESSENTIAL QUESTIONS

- How can graphs be used to organize data?
- How can I analyze data and use what I've learned to answer mathematical questions about it?

MATERIALS

- "What's Your Favorite?, Directions" student sheet
- Paper, markers, crayons, rulers, and other supplies needed to create graphs
- *The Great Graph Contest* by Loreen Leedy or similar book
- "What's Your Favorite? Data Collection – Favorites" student recording sheet (optional)
- "What's Your Favorite? Data Collection – Preferences" student recording sheet (optional)

GROUPING

Partner/Small Group Task

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

By this time, Number Talks should be a part of your daily routine. For additional help with strategy development with addition and subtraction visit chapter 5 and 6 in *Number Talks: Helping Children Build Mental Math and Computation Strategies* by Sherry Parrish (2010).

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION (SMP 1, 2, 3, 4, and 6)

Students survey their classmates to collect data and then display the data using pictographs and Venn diagrams.

This task could be introduced by reading *The Great Graph Contest* by Loreen Leedy or a similar book that uses Venn diagrams and pictographs. (Note: Circle graphs are used in *The Great Graph Contest*, but they are not formally introduced in third grade.) To begin this task, ask the students in the class to brainstorm ideas for categories of student favorites. Some possible ideas are: pet, shoe, color, movie type, animal, dessert, school subject, or sport.

Students should record respondents' names when collecting data for favorites in order to ensure every student in the class is asked the survey question. Alternatively, a student's name can be checked off when they answer the survey question.

As a part of the summarizing for this task, each pair (or selected pairs) of students can share the results of their research, presenting their graphs, and explaining the conclusions they drew from the data.

Students will follow the directions below from the "What's Your Favorite?" directions student sheet. This is your chance to get to know your classmates better! You will work with a partner to research favorites of your classmates and then display the results in pictographs.

Pictograph

- Choose from the list your class brainstormed, a topic on which you would like to survey your classmates.
- Write a question for your survey. (Example: What is your favorite pet, bird, cat, or dog?)
- Create a data collection sheet for **favorites** of your classmates.
- Ask each student in your class the survey question and record their responses. Students can only have one favorite.
- Organize the data in a table.
- Display the data in a pictograph.
- Write a paragraph to share conclusions you can draw about your classmates' favorites. Justify each conclusion with evidence from your pictograph.

Data Analysis

Use your data and graphs to create questions that can be asked about your findings. At least one of the questions should be multistep. Then, exchange your questions with another group member and answer them. Ask at least one question about each of the following:

- Joining and Combining (Addition)
- Separating and Comparing (Subtraction)
- Rounding to the Nearest Ten and Hundred

FORMATIVE ASSESSMENT QUESTIONS

- How many students chose _____ as their favorite? How is that displayed in your graph?
- How did you choose the number of students represented by each symbol on your pictograph?
- What does the pictograph tell you about your classmates' favorites?
- How would your data look if it were a bar graph?
- What comparisons can you make using your data using numbers?
- What is the difference between the actual favorites and estimates?

DIFFERENTIATION

Extension

- Create a book of Class Favorites. Share it on Family Math Night, during parent conferences, etc.
- Create another pictograph. Make your symbol represent a different number than the one you originally chose. Discuss how your pictograph changed.
- Use your data to create a bar graph.

Intervention

- Some students may require some support in a small group setting to be successful with this task. For example, provide some guidance in narrowing a topic, choosing a graphic representation, and/or scaffolding for creating graphs.
- Allow students to create their graphs using web-based programs. See the links below.
    - http://www.beaconlearningcenter.com/documents/2351_5255.pdf Template that can be printed and used to create a pictograph
    - http://faculty.kutztown.edu/schaeffe/Excel/Vallone/Vallone_Excel.pdf Directions to create a pictograph using excel

Intervention Table

TECHNOLOGY CONNECTION

- If students are having difficulty thinking of a question, these websites have many ideas:
    - http://www.canteach.ca/elementary/numbers13.html
- This website allows students to create bar graphs based on random sets of shape.
    - http://www.shodor.org/interactivate/activities/BarGraphSorter/

Name _____ Date _____

What's Your Favorite?

Directions

This is your chance to get to know your classmates better! You will work with a partner to research favorites of your classmates and then display the results in a pictograph.

Pictograph

1. Choose from the list your class brainstormed, a topic on which you would like to survey your classmates.
2. Write a question for your survey. (Example: What is your favorite pet, bird, cat, or dog?)
3. Create a data collection sheet for **favorites** of your classmates.
4. Ask each student in your class the survey question and record their responses. Students can only have one favorite.
5. Organize the data in a table.
6. Display the data in a pictograph.
7. Write a paragraph to share conclusions you can draw about your classmates' favorites. Justify each conclusion with evidence from your pictograph.

Venn Diagram

1. Choose from the list your class brainstormed, a topic on which you would like to survey your classmates.
2. Write a question for your survey. (Example: What types of pets do you like: bird, cat, and/or dog?)
3. Create a data collection sheet for **preferences** of your classmates.
4. Ask each student in your class the survey question and record their responses. Students can like more than one of the choices.
5. Display the data in a Venn diagram.
6. Write a paragraph to share conclusions you can draw about your classmates' preferences. Justify each conclusion with evidence from your Venn diagram.

Name_____ Date _____

What's Your Favorite?

Data Collection – Favorites

What is your favorite _____?

What is your favorite _____? (Choose One)	Student Names

Name _____ Date _____

What's Your Favorite?

Data Collection - Preferences

Do you like _____, _____, and /or _____? (May choose more than one.)	Student Names

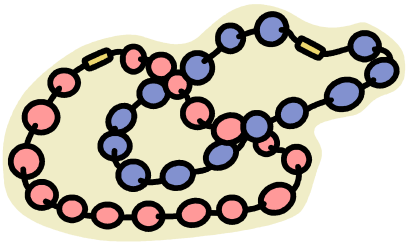
Do you like _____, _____, and/or _____?

SCAFFOLDING TASK: CUT AND PLOT!

Back to Task Table

In this task, students will measure varying string lengths and create a line plot.

CONTENT STANDARDS



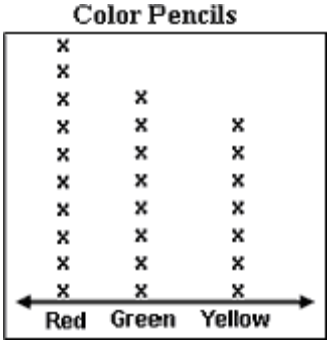
MGSE3.MD.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units - whole numbers, halves, or quarters.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

One advantage of line plots is every piece of information is shown on the graph. It is also a very easy type of graph for students to make. It is essentially a bar graph with a potential bar for every possible value.



This task is designed to develop rounding, measuring to the nearest inch, and addition skills. Students have already had opportunities to measure to the nearest whole inch in 2nd grade and plotting their measurements on a line plot graph. This task will link the idea of rounding with measuring to the closest whole inch and will also highlight that rounding does not give an exact measurement.

COMMON MISCONCEPTIONS

Students may read the mark on a scale that is below a designated number on the scale as if it was the next number. For example, a mark that is one mark below 80 grams may be read as 81 grams. Students realize it is one away from 80, but do not think of it as 79 grams.

Although intervals on a bar graph are not in single units, students count each square as one. To avoid this error, have students include tick marks between each interval. Students should begin each scale with 0. They should think of skip-counting when determining the value of a bar since the scale is not in single units.

ESSENTIAL QUESTIONS

- How can graphs be used to organize data?
- How can I analyze data and use what I've learned to answer mathematical questions about it?

MATERIALS

- pre-cut yarn or string in various lengths (rings, bracelets, necklaces) (handful of string for each group)
- ruler
- recording sheet

GROUPING

Partner/Small Group Task

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

By this time, Number Talks should be a part of your daily routine. For additional help with strategy development with addition and subtraction visit chapter 5 and 6 in *Number Talks: Helping Children Build Mental Math and Computation Strategies* by Sherry Parrish (2010).

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION (SMP 1, 2, 3, 4, 5, 6, 7, 8)

In this task, students will practice measuring to the nearest inch and using the data found to create a line plot. Have pre-cut string ready for students, cut in varying lengths that would be appropriate for rings, bracelets, and necklaces. Each group should get enough string to develop a line plot from.

Pass out string, rulers, and recording sheet to each group. Read the problem to the students:

Susie owns a jewelry shop, but is not very organized! She has taken all of her strings, used to make jewelry, and stored them in a large pile. She needs your help in determining how many rings, bracelets, and necklaces can be made from the string that was found. Measure each string, to the nearest whole inch, and record the measurements in a line plot graph. Once finished, answer the questions below.

The students will then measure each string to the nearest whole inch and record the measurements in the line plot graph and answer the questions. It is imperative that the teacher implement the number talk before this activity to ensure conceptual understanding. Otherwise they will not be able to justify how they rounded to the nearest whole number.

FORMATIVE ASSESSMENT QUESTIONS

- How do you know that string should be a _____ (ring, bracelet, or necklace)?
- How did you determine which inch was the closest?

DIFFERENTIATION

Extension

- Tape a measuring tape to the wall and give each student a sticky note with their name on it. Have them jump and slap their sticky note as high as they can on the measuring tape. Students then create a line plot graph to display their classmates data.

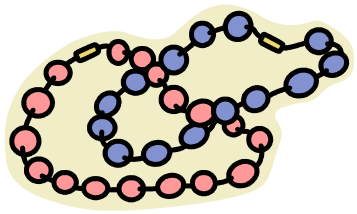
Intervention

- Provide students a ruler that only has whole numbers and halves marked. You can print one off at the following website: http://www.eduplace.com/math/mthexp/g3/visual/pdf/vs_g3_144.pdf

Intervention Table

Name _____ **Date** _____

Cut and Plot



1. What were three things you noticed about your line plot graph?

2. What is the difference between your longest plot and your shortest plot?

3. What does this line plot tell you about the jewelry Suzie can make?

4. Write 2 more questions about your line plot, and have a friend answer the questions.

CULMINATING TASK: WHAT'S THE STORY HERE?

Back to Task Table

In this task, students will create a book based on all standards covered in Unit 1. This culminating task represents the level of depth, rigor, and complexity expected of all third grade students to demonstrate evidence of learning.

CONTENT STANDARDS

MGSE3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

MGSE3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

STANDARDS FOR MATHEMATICAL PRACTICE (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Thorough and in-depth experiences with the concepts contained in this unit, such as addition and subtraction, place value, rounding, and arithmetic properties is necessary prior to asking students to complete this assessment independently.

ESSENTIAL QUESTIONS

- How can I show what I know about addition, subtraction, problem solving, and estimation?

MATERIALS

- Large paper (11"x 17") – one sheet per student
- Scissors
- Markers, crayons, or colored pencils

GROUPING

Independent Performance Assessment

NUMBER TALK (SMP 1, 2, 3, 6, and 8)

By this time, Number Talks should be a part of your daily routine. For additional help with strategy development with addition and subtraction visit chapter 5 and 6 in *Number Talks: Helping Children Build Mental Math and Computation Strategies* by Sherry Parrish (2010).

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

SMP's 1, 2, 3, 4, 5, 6, 7, 8

While this task is intended to serve as a summative assessment, it also may be used for teaching and learning. If used as an assessment, it is important that all elements of the task be addressed throughout the unit so that students understand what is expected of them. Also, if using a rubric, students should be given a copy of the rubric as part of the teacher introduction of the assessment, so that they are aware of the expected rigor and quality for their work.

Students make a book following given guidelines that demonstrate many of the concepts learned in this unit. Encourage students to write all of their word problems based on one topic or theme. For example, students could choose to write all problems about soccer or a favorite hobby.

Below are the student directions for this task.

Your task is to make a book to demonstrate what you have learned in this unit. While there are many ways to make a simple 8-page book, the directions for one foldable are at the following link: http://www.shininghours.com/creating/one_sheet_8_pages!.htm
Your book will need 8 pages. Use the following directions to complete your book.

- Page 1 – title, author, publishing date
- Page 2 – addition story showing the commutative, associative, and identity properties
- Page 3 –addition story (multi step) using three or four-digit numbers
- Page 4 – addition story showing rounding to the nearest ten
- Page 5 – subtraction story (multistep) showing take-away using three or four-digit numbers
- Page 6 – subtraction story showing comparison
- Page 7 – subtraction story showing rounding to the nearest hundred

Make sure each page contains the following:

- Use at least one two-digit and one three-digit number in each story
- Model each story with an illustration or drawing using base ten blocks,
- Put the correct solution on the back of each page or in a separate answer key
- Show how you checked your work by using the inverse operation.

Make sure your book is clearly written, that your math stories are correctly spelled, capitalized, and punctuated, and that you follow the steps above when making your book. Put page numbers on the bottom right hand corner of your book pages and if desired, decorate the title page.

FORMATIVE ASSESSMENT QUESTIONS

- What is your plan for completing this assessment?
- Do you have a draft of your project?
- How will you prove that your answers are correct?

DIFFERENTIATION

Extension

- Rather than having a separate page for each of the properties, ask students to identify the use of each property within other pages of the book. In this way, students can create their own problem and solution for the three open pages.

Intervention

- Provide story frames or other supportive structures to allow students to be successful in completing each page of their book.
- Break the task into related, manageable chunks, eliminating unnecessary steps or combining steps (for example, estimation could replace one of the addition or subtraction pages).

Intervention Table

TECHNOLOGY

An alternative to creating a book would be to use PowerPoint, Prezi, or a similar program, and have some (or all) students make slides, video, etc. instead of a book. Photographs of the students and their work can be inserted into PowerPoint or Prezi for a presentation for parents for the current year or to show benchmark work to students next year.

Name _____ Date _____

WHAT'S THE STORY HERE?

Your task is to make a book to demonstrate what you have learned in this unit. There are many ways to make a simple 8-page book, the directions for one foldable book are at the following link: http://www.shininghours.com/creating/one_sheet_8_pages!.htm

Your book will need 8 pages. Use the following directions to complete your book.

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- Page 6 – subtraction story showing comparison
- Page 7 – subtraction story showing rounding to the nearest hundred

Make sure each page contains the following:

- Use at least one two-digit and one three-digit number in each story
- Model each story with an illustration or base ten drawing,
- Put the correct solution on the back of each page or in a separate answer key
- Show how you checked your work by using the inverse operation.

Make sure your book is clearly written, that your math stories are correctly spelled, capitalized, and punctuated, and that you follow the steps above when making your book. Put page numbers on the bottom right hand corner of your book pages and if desired, decorate the title page.