CCGPS Frameworks Student Edition

Mathematics

Fourth Grade Unit One
Whole Numbers, Place Value, and Rounding in Computation

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"Making Education Work for All Georgians"

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Unit 1
WHOLE NUMBERS, PLACE VALUE, AND ROUNDING

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OVERVIEW

In this unit students will:

- read numbers correctly through the millions
- write numbers correctly through millions in standard form
- write numbers correctly through millions in expanded form
- identify the place value name for multi-digit whole numbers
- identify the place value locations for multi-digit whole numbers
- round multi-digit whole numbers to any place
- solve multi-step problems using the four operations

Although the units in this instructional framework emphasize key standards and big ideas at specific times of the year, routine topics such as estimation, mental computation, and basic computation facts should be addressed on an ongoing basis. The first unit should establish these routines, allowing students to gradually enhance their understanding of the concept of number and to develop computational proficiency.
To assure that this unit is taught with the appropriate emphasis, depth, and rigor, it is important that the tasks listed under "Evidence of Learning" be reviewed early in the planning process. A variety of resources should be utilized to supplement the tasks in this unit. The tasks in these units illustrate the types of learning activities that should be utilized from a variety of sources.

CRITICAL AREAS OF FOCUS

In Grade 4, instructional time should focus on three critical areas:
1. Developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends.

2. Developing an understanding of fractions equivalence, addition and subtraction of fractions with like denominators and multiplication of fractions by whole numbers.

3. Understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, particular angle measures, and symmetry.

STANDARDS FOR MATHEMATICAL CONTENT

Use the four operations with whole numbers to solve problems.

MCC4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Generalize place value understanding for multi-digit whole numbers.

MCC4.NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*

MCC4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

MCC4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.

Use place value understanding and properties of operations to perform multi-digit arithmetic.
MCC4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

STANDARDS FOR MATHEMATICAL PRACTICE

This section provides examples of learning experiences for this unit that support the development of the proficiencies described in the Standards for Mathematical Practice. These proficiencies correspond to those developed through the Literacy Standards. The statements provided offer a few examples of connections between the Standards for Mathematical Practice and the Content Standards of this unit. This 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 place value and rounding in computation.

2. **Reason abstractly and quantitatively.** Students demonstrate abstract reasoning about relative size of numbers.

3. **Construct viable arguments and critique the reasoning of others.** Students construct and critique arguments regarding number strategies including addition and subtraction or rounding strategies.

4. **Model with mathematics.** Students use base ten materials to demonstrate understanding of a multi-digit whole number.

5. **Use appropriate tools strategically.** Students select and use tools such as place value charts and base ten materials to identify patterns within the base ten system.

6. **Attend to precision.** Students attend to the language of real-world situations to determine if addition and subtraction answers are reasonable.

7. **Look for and make use of structure.** Students relate the structure of the base ten system to recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.

8. **Look for and express regularity in repeated reasoning.** Students relate the structure of the base ten system to explain that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.
   ***<u>**Mathematical Practices 1 and 6 should be evident in EVERY lesson.**</u> ***

ENDURING UNDERSTANDINGS

- The value of a number is determined by the place of its digits.
- Whole numbers are read from left to right using the name of the period.
- Numbers are written using commas to separate periods.
- Using rounding is an appropriate estimation strategy for solving problems and estimating.
- Rounded numbers are approximate and not exact.
- A number can be written using its name, standard, or expanded form.

ESSENTIAL QUESTIONS Choose a few questions based on the needs of your students.

- How does our base-10 number system work?
- How does understanding base-10 number system help us add and subtract?
- How do digit values change as they are moved around in large numbers?
- What determines the value of a digit?
- How does estimation keep us from having to count large numbers individually?
- How are large numbers estimated?
- What conclusions can I make about the places within our base ten number system?
- What happens to a digit when multiplied and divided by 10?
- What effect does the location of a digit have on the value of the digit?
- How can we compare large numbers?
- What determines the value of a number?
- Why is it important for me to be able to compare numbers?
- What is a sensible answer to a real problem?
- What information is needed in order to round whole number to any place?
- How can I ensure my answer is reasonable?
- How can rounding help me compute numbers?
- What effect does a remainder have on my rounded answer?
- What strategies can I use to help me make sense of a written algorithm?

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 understanding for multi-digit whole numbers
- Round to any place
- Fluently add and subtract within 1000 using strategies

COMMON MISCONCEPTIONS

Numbers Base Ten -
NBT.2 - There are several misconceptions students may have about writing numerals from verbal descriptions. Numbers like one thousand two causes problems for students. Many students will understand the 1000 and the 2 but instead of placing the 2 in the ones place, students will write the numbers as they can hear them, 10002 (ten thousand two). There are multiple strategies that can be used to assist with this concept, including place-value boxes and vertical-addition methods.

Students often assume that the first digit of a multi-digit number indicates the "greatness" of a number. The assumption is made the 954 is greater than 1002 because students are focusing on the first digit instead of the number as a whole.

Students need to be aware of the greatest place value. In this example, there is one number with the lead digit in the thousands and another numbers with its lead digit in the hundreds.

Development of a clear understanding of the value of the digits in a number is critical for the understanding of and using numbers in computations. Helping students build the understanding that 12345 means one ten thousand or 10,000, two thousands or 2000, three hundreds or 300, four tens or 40, and 5 ones or 5. Additionally, the answer is the sum of each of these values 10,000 + 2000 + 300 + 40 + 5.

NBT.4 - Often students mix up when to "carry" and when to "borrow". Also students often do not notice the need of borrowing and just take the smaller digit from the larger one. Emphasize place value and the meaning of the digits.

If students are having difficulty with linking up similar place values in numbers as they are adding and subtracting, it is sometimes helpful to have them write their calculations on the grid paper. This assists the student with lining up the numbers more accurately.

If students are having a difficult time with a standard addition algorithm, a possible modification to the algorithm might be helpful. Instead of the "shorthand" of "carrying," students could add by place value, moving left to right placing the answers down below the "equals" line. For example:

```
  249
+ 372
 500                    (Start with 200 + 300 to get the 500
  110                   then 40 + 70 to get 110
   11                   and 9 + 2 to get 11.)
  621
```

SELECTED TERMS

Note – At the elementary level, different sources use different definitions. Please preview any website for alignment to the definitions given in the frameworks. The writers of the Common Core Standards wrote a glossary of mathematical terms and it can be found at: http://www.corestandards.org/Math/Content/mathematics-glossary/glossary. The terms below are for teacher reference only and are not to be memorized by the students. **The terms below are for teacher reference only and are not to be memorized by the students**.

- algorithm
- digits
- estimate
- expanded form
- numbers
- numerals
- period
- place value
- rounding

STRATEGIES FOR TEACHING AND LEARNING

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

EVIDENCE OF LEARNING

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

- Read multi-digit whole numbers.
- Write multi-digit-numbers.
- Recognize numbers in standard, expanded, and word form.
- Round multi-digit numbers to any place.
- Compare rounded multi-digit numbers and express their relationship using >, <, or =.
- Estimate sum and/or difference of numbers apply estimation to solve problems and determine when it is necessary or appropriate to apply estimation strategies.

TASKS

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

learning. It is important that all elements of a task be addressed throughout the learning process so that students understand what is expected of them. While some tasks are identified as a performance task, they also may be used for teaching and learning.

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.
Performance Task	Tasks which may be a formative or summative assessment that checks for student understanding/misunderstanding and or progress toward the standard/learning goals at different points during a unit of instruction.
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.
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.
CTE Classroom Tasks	Designed to demonstrate how the Common Core and Career and Technical Education knowledge and skills can be integrated. The tasks provide teachers with realistic applications that combine mathematics and CTE content.

Task Name	Task Type/Grouping Strategy	Content Addressed	Standard(s)
What Comes Next	Scaffolding Task *Partner/Small Group Task*	Relative size of numbers	MCC4.NBT. 1
Relative Value of Places	Constructing Task *Partner/ Small Group Task*	Relative size of numbers	MCC4.NBT.2 MCC4.NBT. 1
Building 1,000	Performance Task *Individual/ Partner Task*	Making and Naming Large Numbers	MCC4.NBT. 1 MCC4.NBT.2
Number Scramble	Practice Task *Individual/Partner Task*	Making and Naming Large Numbers	MCC4.NBT.2

Ticket Master	Practice Task *Individual/Partner Task*	Ordering Larger Numbers	MCC4.NBT.2
Nice Numbers	Constructing Task *Partner/Small group Task*	Rounding, Four Operations	MCC4.OA.3 MCC4.NBT.4 MCC4.NBT.3
Estimation as a Check	Constructing Task *Individual/ Partner Task*	Rounding, Adding, Subtracting multi-digit numbers	MCC4.NBT.4 MCC4.NBT.3
Making Sense of the Algorithm	Constructing Task *Individual/Partner Task*	Fluently subtracting multi-digit numbers	MCC4.NBT.4
Reality Checking	Constructing Task *Individual/ Partner Task*	Ordering, Adding, Subtracting and Rounding multi-digit numbers	MCC4.NBT.2 MCC4.NBT.4 MCC4.NBT.3
It's in the Number	Culminating Task *Individual Task*	Calculation and Estimation with Whole Numbers	MCC4.OA.3 MCC4.NBT.2 MCC4.NBT.3

Should you need further support for this unit, please view the appropriate unit webinar at :
https://www.georgiastandards.org/Common-Core/Pages/Math-PL-Sessions.aspx

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 may 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	FALS	Content Addressed	Pacing

Assessments	(Supporting Lesson Included)		(Use before and after these tasks)
Ordering 4-digit numbers		Ordering Larger Numbers	What Comes Next Build 1,000 Relative Value of Places Number Scramble Ticket Master
To regroup or not to regroup		Using the Addition Algorithm	Nice Numbers Estimation as a Check Making sense of an Algorithm Reality Checking

SCAFFOLDING TASK: WHAT COMES NEXT?

(*Adapted from Teaching Student Centered Mathematics Volume 2)*

TASK CONTENT: This task helps pre-assess students' previous knowledge and misconceptions about place value and number sense.

STANDARDS FOR MATHEMATICAL CONTENT

MCC4. NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.

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.
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 helps pre-assess students' previous knowledge and misconceptions about place value and number sense. The strategies they use to solve the problem demonstrate students' understanding about a number of concepts including place value, grouping, computation, number sense, patterns, and mathematical communication.

COMMON MISCONCEPTIONS

Two important ideas developed for three-digit numbers should be extended to larger numbers. First, the grouping idea should be generalized. That is, ten in any position makes a single thing (group) in the next position, and vice versa. Second, the oral and written patterns for numbers in three digits are duplicated in a clever way for every three digits to the left. These two related ideas are not as easy for students to understand as adults seem to believe. Because models for large numbers are often difficult to demonstrate or visualize, textbooks frequently deal with these ideas in a predominantly symbolic manner. That is not sufficient (Van de Walle, page 47-48)!

ESSENTIAL QUESTIONS

- How does our base-10 number system work?
- How does understanding base-10 number system help us add and subtract?

MATERIALS

- base-ten blocks
- recording sheet #19 from PDToolkit at http://pdtoolkit.pearson.com

GROUPING

Students work in groups or pairs.

NUMBER TALKS

In the Fourth Grade Grade Level 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. 5 to 15 minutes each day is dedicated to students sharing the ownership of determining whether answers are accurate, and given the expectation of thinking through all solutions and strategies carefully (Parrish, 2010). During the *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 gives a problem on the board in whole group or small setting. The students mentally solve the problem and share with the whole group HOW they arrived at their answer. They must justify and defend their answer and their thinking. The teacher simply records the students' thinking and poses extended questions to draw out deeper understanding for all. To let the teacher know they are ready, they make a fist and place it on their chest. If they have two strategies to share, they place two fingers on their chest and so on. 15 minutes max daily!!!

Some lessons lend themselves to Number Talks better than others. You may modify/change them based on the needs of your students. Number Talks suggestions are included in tasks where appropriate.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Throughout the year, you will be incorporating Number Talks into your daily mathematical discussions. Number Talks is based on the premise of mental computations which means students will rely heavily on **place value knowledge and understanding**. The following task will cause the students to focus on number relationships and use these relationships to develop efficient, flexible strategies with accuracy (Parrish, page 13). It is important for students to realize that the number system does have a logical structure, is not totally arbitrary, and can be understood (Van de Walle, page 166).

Students will be able to compose or make large numbers up to 1000 using base 10. This task will aid the students in their conceptual understanding of composing numbers which will later lead to them decomposing numbers when doing expanded notation and calculating mentally during the computation of addition, subtraction, multiplication, and division.

Use paper models of base-ten strips and squares (see attached website to download Blackline Master). The unit or ones piece is a one cm square. The tens piece is a 10 cm by 1 cm strip. The 100 piece is a square, 10 cm X 10 cm. What is next? Ten hundreds is called a thousand. What shape would a thousand be? Tape together a long strip made of ten paper hundreds squares. What comes next? (Reinforce the idea of ten makes one that has progressed to this point). Ten thousand strips would make a square measuring one meter on each side making a paper 10,000 model. Once the class has figured out the shape of each piece, the problem posed to them is "What comes next?" Let small groups work on the dimensions on a 100, 000 piece. Ten ten-thousand squares (100,000) go together to make a huge strip. Draw this strip on a long sheet or roll of paper, and mark off the 10 squares that make it up. You will have to go out in the hall. **This lesson by Van de Walle is full of rigor for the student and teacher but worth the conceptual understanding of a number.**

FORMATIVE ASSESSMENT QUESTIONS

- What's the consistent pattern in every number?
- What is the relationship of the phrase "base 10" as a number progresses from right to left?
- Could there be another base besides 10? Justify or defend your thinking.

DIFFERENTIATION

Extension

- *Collections*- As a class or grade-level project, collect some type of object with the objective of reaching some specific quantity-for example, 1,000 or 10,000 buttons, walnuts, old pencils, jar lids, pieces of junk mail, soup labels, or cereal box tops.
- *Illustrations*- Sometimes it is easier to create large amounts. For example, start a project where students draw 100 or 200 or even 500 dots on a sheet of paper.

Intervention

- Using the base ten blocks, the students could build a number and have a peer determine what the number was created and orally give the value of each place contingent upon the blocks.

TECHNOLOGY CONNECTIONS

- http://real.doe.k12.ga.us/content/math/destination_math/msc3/msc3/msc3/MSC3/MSC3/Module1/Unit1/Session1/Tutorial.html This resource provides videos which can be used as an introduction to the concept or as a form as remediation.

- http://illuminations.nctm.org/LessonDetail.aspx?ID=L367 Use this resource as a follow-up lesson to extend place value understanding.

- http://www.prometheanplanet.com/en-us/Resources/Item/109644/place-value-through-100-000 A lesson for your ActivSlate or SmartBoard to reinforce basic place value ideas through 100,000.

Constructing Task: Relative Value of Places

Adapted from Relative Value of Places, nzmaths, Adding, Subtraction and Place Value

TASK CONTENT: In this task, students will explore patterns in the base-ten system.

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.

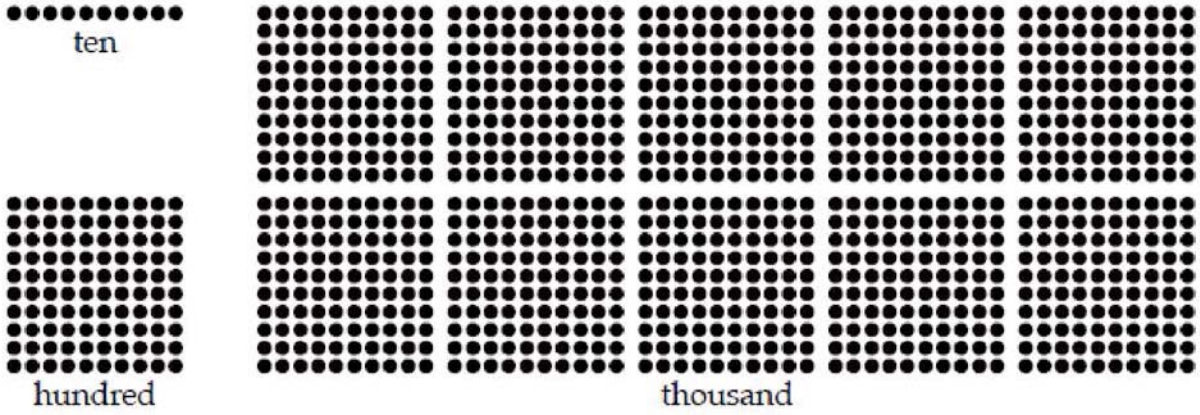
MCC4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE TO BE EMPHASIZED

2. Reason abstractly and quantitatively.
4. Model with mathematics
6. Attend to precision.
7. Look for and make use of structure.

BACKGROUND KNOWLEDGE

Students unfamiliar with dotty arrays will need to become familiar with the representation of 1, 10, 100, 1 000, and so on as arrays of single dots. This will help them to recognize the relative value of the places.



ESSENTIAL QUESTIONS

- What conclusions can I make about the places within our base ten number system?

- What happens to a digit when multiplied and divided by 10?
- What effect does the location of a digit have on the value of the digit?

MATERIALS

- Large dot arrays

GROUPING

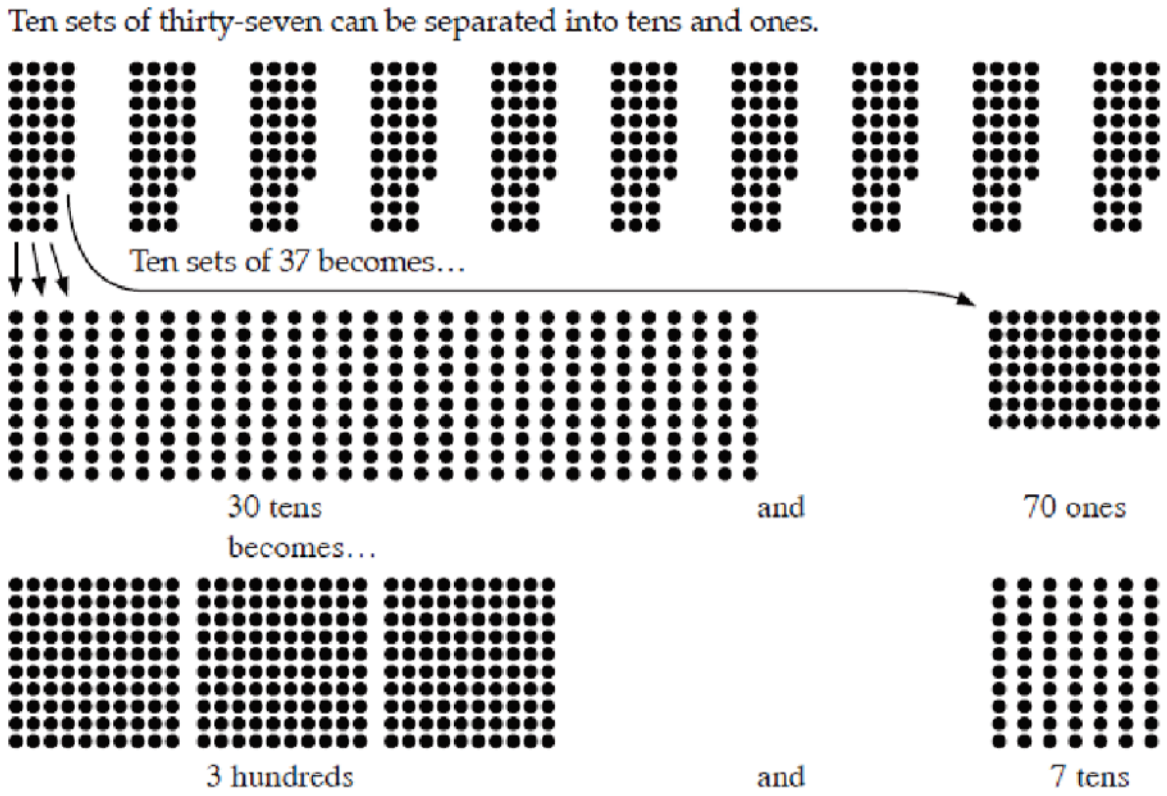
Partner or small group

NUMBER TALKS

In her book *Number Talks,* Sherry Parrish discusses the importance place value. She states, "the true test of whether students understand place value is if they can apply their understanding in computation." This lesson helps students understand what happens to numbers when they are multiplied or divided by 10. Students can begin using this skill to write number in expanded form and begin applying those skills to multiplying partial products.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comments:
Ask ten students to make a two-digit number, e.g., 37, using the dotty array pieces.
Pose this problem: "Imagine there are ten students and they each have 37 marbles/apples/dollars."
Put the sets of 37 into a central space. "How many dots is that altogether?"
Some students are likely to have symbolic algorithms, such as "add a zero," that enable them to get an answer of 370. Examine the actions on materials that explain the use of zero as a place holder. For example:



Using a place value chart, connect 37 with the result of 10 x 37:

Ten Thousands	Thousands	Hundreds	Tens	Ones
			3	7
		3	7	0

In this way, the students may notice that the digits have shifted one place to the left. Pose several other problems where ten students make numbers with dot array parts and look at the combined product. For each example, separate the place values to see what contribution they make to the whole product, and write the number and it's ten times equivalent on the place value chart.

Further challenge the students by making a two-digit number and posing problems such as, "Imagine that one hundred students had 42 marbles/apples/dollars each. How many would that be in total?" Ask the students how this might be modeled. In these cases, each of the ten students will need to create each number ten times. This is a useful generalization that shows that ten times ten times of any number is one hundred times that number.

Transfer the focus to dividing by ten and by one hundred. Begin with a four-digit number like 3,800 (zero in the tens and ones places). Make this number with dot array pieces. Pose this problem: "I

have 3,800 marbles and I am going to share them equally among all ten of you. How many marbles will you get each?" Ask the students to predict the result of the sharing, and then confirm it by modeling with the materials.

The result of dividing 3,800 by ten can be shown on a place value chart as:

Ten Thousands	Thousands	Hundreds	Tens	Ones
	3	8	0	0
		3	8	0

The symbolic effect of dividing by ten is to shift the digits of the dividend (3,800) one place to the right. Ask the students to predict what the result would be if they shared 3,800 into one hundred equal sets. Expect them to realize that the shares would be one-tenth of 380, which is 38.
This may need to be acted out by cutting the 3 hundreds in 30 tens and the 8 tens into 80 ones so the tenth shares can be established. Use the place chart to connect 3,800 and the result of 3,800 ÷ 100 = 38. In this case, the symbolic effect is a two-place shift to the right.

Pose problems like these below, expecting the students to reason the answers using place value understanding, not through the use of multiplication. The students must be able to justify their answers by explaining what occurs with the quantities involved.

1. 100 boxes of 376 coins *(37,600)*
2. 10 boxes of 376 coins *(3,760)*
3. 960 skittles shared among 10 people *(96)*
4. 960 skittles shared among 1 people *(960)*
5. 10 sets of 40 pencils *(400)*
6. 100 sets of 40 pencils *(4,000)*
7. 1000 sets of 40 pencils *(40,000)*
8. 4,300 movie tickets shared among 100 people *(43)*
9. 4,300 movie tickets shared among 10 people *(430)*
10. 1000 sets of 56 marbles *(56,000)*
11. 10,000 sets of 56 marbles *(560,000)*

FORMATIVE ASSESSMENT QUESTIONS

- What happens to the value of the digit in the ones place when the number is multiplied by 10?
- What happens to the value of the digit in the tens place when the number is divided by 10?
- What can you concluded about the value of a digit in the ones place compared to the value of that same digit in the tens place? What about the tens place and hundreds place? What about the hundreds place and thousands place?
- Which number is larger 960 or 96? How do you know? Why?

DIFFERENTIATION

Extension

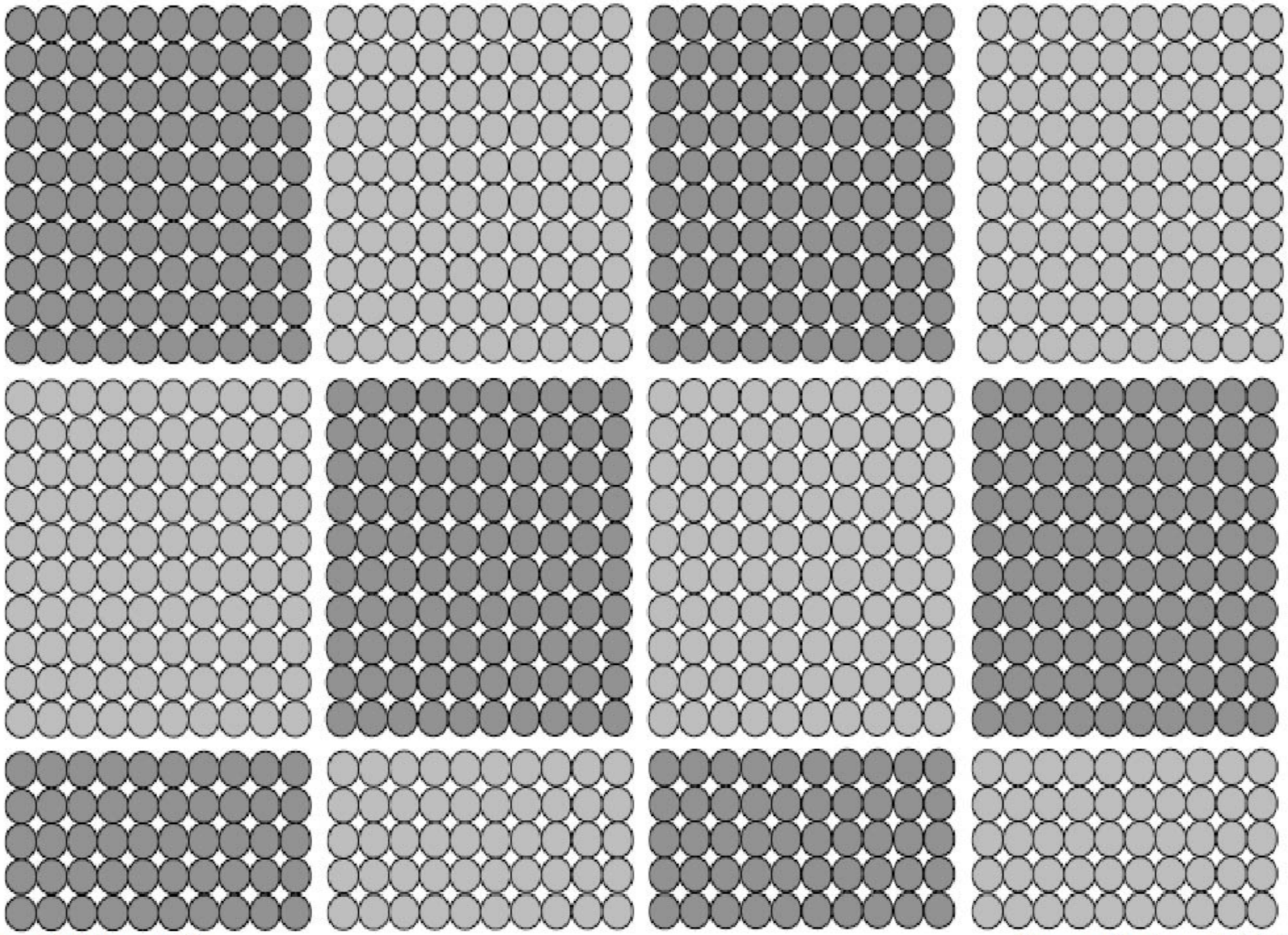
- Have students explain what the value of a digit to the right of the ones place would be based on their conclusion about whole numbers.
- Have students record the number sentences associated with each problem.

Intervention

- Allow students to use base ten blocks to build numbers.

TECHNOLOGY CONNECTIONS

- http://illuminations.nctm.org/LessonDetail.aspx?ID=L367 This link provides a lesson where students can attempt to identify the concept of a million by working with smaller numerical units. This could be a wonderful extension lesson for the Relative Sizes task.
- http://www.ixl.com/math/grade-4/convert-between-place-values This serves as a means for students to practice place value understanding.



Performance Task: Building 1,000

TASK CONTENT: This activity helps students begin to make some connections about place value, as well as gives them a visual perspective and sense of the number 1,000.

STANDARDS FOR MATHEMATICAL CONTENT

MCC4. NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.

MCC4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE TO BE EMPHASIZED

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively.
4. Model with mathematics.
6. Attend to precision.
7. Look for and make use of structure.

BACKGROUND KNOWLEDGE

This task helps assess students' previous knowledge and misconceptions about place value and number sense. The strategies they use to solve the problem demonstrate students' understanding about a number of concepts including place value, grouping, computation, number sense, patterns, and mathematical communication.

It is important that students understand that they are actually building the number 1,000. Have students brainstorm inexpensive and appropriate materials to build with. It is also a good idea to let parents know what you are doing and to ask them for donations. You will need to provide ample space for students to build and store their designs.

ESSENTIAL QUESTIONS

- How do digit values change as they are moved around in large numbers?
- What determines the value of a digit?
- How does estimation keep us from having to count large numbers individually?
- How are large numbers estimated?

MATERIALS

- Building materials such as straws, toothpicks, noodles, string, pennies, paper clips, etc.

- Tape measures, rulers, yardsticks
- Poster board, markers, overheads for presenting, tape, glue, etc.

GROUPING

Individual/Partner Task

NUMBER TALKS

In the Fourth Grade Grade Level 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. 5 to 15 minutes each day is dedicated to students sharing the ownership of determining whether answers are accurate, and given the expectation of thinking through all solutions and strategies carefully (Parrish, 2010). During the *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 gives a problem on the board in whole group or small setting. The students mentally solve the problem and share with the whole group HOW they arrived at their answer. They must justify and defend their answer and their thinking. The teacher simply records the students' thinking and poses extended questions to draw out deeper understanding for all. To let the teacher know they are ready, they make a fist and place it on their chest. If they have two strategies to share, they place two fingers on their chest and so on. 15 minutes max daily!!!

Some lessons lend themselves to Number Talks better than others. You may modify/change them based on the needs of your students. Number Talks suggestions are included in tasks where appropriate.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comments

This activity will allow the teacher to identify students who already have an understanding of 1,000 and how well they understand place value and number sense. This activity helps students begin to make some connections about place value, as well as gives them a visual perspective and sense of the number 1,000. The students get very excited thinking about what they might use to "build" 1,000 and are quite creative in their selection of materials. If used at the end, teachers will be able to see how well students understand place value and number sense, and use the knowledge of varying levels of student understanding to inform the use of the remaining tasks.

Task Directions

Students will answer the following questions on the student recording form:

- What does 1,000 look like? How long is it? How tall is it? How big is it? How much space will it take up?

- To answer these questions, decide what type of material you would like to use to show 1,000. Next, make a prediction about the size you think your 1,000 will be.

- Next, using words and pictures, explain what you did to make your prediction.

Once students have answered these questions, they will use materials they've chosen to create their model of 1,000. Then they will answer the following questions, and prepare their presentation for their classmates.

- What strategies did you use to create 1,000?

- What did you learn from this investigation of 1,000? Did you notice any patterns or connections?

- When you have completed this task, plan a presentation of your investigation for the class.

FORMATIVE ASSESSMENT QUESTIONS

- How can you show the relationship between different place values?
- What do you know about 1,000 that you didn't know before?
- How can you show the different place values within 1,000?
- What makes 10 different from 100 and from 1000?
- What do you notice about how different materials work? Are some better than others at showing 1,000? Why or why not?
- Did you notice any patterns or connections?
- What strategies did you use to solve this?
- How can you effectively share what you've discovered?.

DIFFERENTIATION

Extension

- Have students to experiment with larger numbers such as 10,000; 100,000; 100,000,000, etc.

Intervention

- Students may need to begin with 100.

TECHNOLOGY CONNECTIONS

- http://illuminations.nctm.org/LessonDetail.aspx?ID=L367 Use this resource as a follow-up lesson to extend place value understanding.
- http://www.prometheanplanet.com/en-us/Resources/Item/109644/place-value-through-100-000 A lesson for your ActivSlate or SmartBoard to reinforce basic place value ideas through 100,000.

Name _____ Date _____

Building 1,000

What does 1,000 look like? How long is it? How tall is it? How big is it? How much space will it take up? Describe the model for 1,000 that you will create:

_____

_____

What type of material you would like to use to show 1,000? Make a prediction about the size of your 1,000 model._____

_____

_____

Next, using words and pictures, explain what you did to make a prediction about the size of your model.

_____

_____

_____

After you have created your model, answer the following questions:

What strategies did you use to create 1,000?

_____

_____

_____

What did you learn from this investigation of 1,000? Did you notice any patterns or connections?

_____

_____

_____

When you have completed this task, plan a presentation of your investigation for the class.

Practice Task: Number Scramble

TASK CONTENT: In this task, students will manipulate the ten digits of the base ten-numeration system to complete various activities such as constructing large and small numbers and numbers with specific values in a given place, write numbers in expanded and standard form.

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE TO BE EMPHASIZED

2. Reason abstractly and quantitatively.
4. Model with mathematics.
6. Attend to precision.

BACKGROUND KNOWLEDGE

Students should have had prior experiences and/or instruction with ordering, writing numbers in expanded and standard form and comparing large numbers.

ESSENTIAL QUESTIONS

- How do digit values change as they are moved around in large numbers?
- What determines the value of a digit?

MATERIALS

- Scissors
- "Number Scramble" Recording Sheet
- Blank Place Value Chart

GROUPING

Individual/Partner Task

NUMBER TALKS

Now that students have explored what happens to a number when it is multiplied or divided by 10, they should be ready to attempt some mental calculations using partial products. For example, students could calculate 4 x 16 by first decomposing 16 into 10 + 6, then solving 4 x 10, and then 4

x 6. Finally they could combine the products of 40 and 24 for a final product of 64. Keep in mind that students may arrive at the product of 64 without using this particular strategy.

Please refer to pgs. 272-275 in *Number Talks* by Sherry Parrish for more examples of number talks that will further develop this strategy.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students will manipulate the ten digits of the base ten-numeration system to complete various activities such as constructing large and small numbers and numbers with specific values in a given place, write numbers in expanded and standard form.

Comments

As students manipulate the numbers in this task, you will be able to see quickly which students have a good grasp of place value and the value of digits- of a number. For example, in steps 1 and 2, if students randomly place their numbers, they may need more practice to understand how the value of a number changes as its digits change.

Task Directions

Students will cut out number boxes (tiles) and use them to create numbers with the given requirements.

1. Make the largest whole number possible using 9 different tiles. Write your answer in standard form and expanded form.
2. Make the smallest whole number possible using 9 different tiles. Write your answer in standard form and expanded form.
3. Make a number worth more than two million, with a six in the ten-thousands place. Write the number in standard form and expanded form. Compare your number with your partner.
4. Make a number less than five million that has a two in the thousands' place. Write the number in standard form and expanded form. Compare your number with your partner.
5. Make a number that has only odd numbers in the thousands' period of the place value chart. Write the number in words.
6. Look carefully at your answers to Questions 1 and 2. Find one digit that is in **both** of your answers. How does the value of this digit change from the way you used it in Question 1 to the way you used it in Question 2? Use complete sentences to explain how and why the value of the digit did or did not change between the two answers.

FORMATIVE ASSESSMENT QUESTIONS

- Explain how you decided the order of the digits.
- How can you tell which number is the largest or smallest?
- How does the value of a digit change when it is moved to the left on the place value chart? To the right?
- How could a place value chart help you if you are confused about which order the numbers.

DIFFERENTIATION

Extension

- Have students use all ten tiles to answer questions.
- Have students use tiles to create to develop two more additional questions to have their partners to solve.

Intervention

- Start students with building numbers in the hundreds, then the thousands, etc.
- Allow students to use a blank place value chart and write the numbers in the chart, showing the correct placement of the digits. This cueing device may assist students in comparing digits in the same place in order to determine value.
- Have students to use Base ten blocks to show their numbers.

TECHNOLOGY CONNECTIONS

- http://www.prometheanplanet.com/en-us/Resources/Item/93852/compare-whole-numbers-to-the-millions This interactive flipchart lesson on comparing whole numbers, can be used n used with your ActivSlate or Smartboard. It can be used in whole group, small group or student led centers.
- http://www.aaamath.com/cmp.htm This online activity has students comparing large numbers and determine their placement in a series of numbers. It can serve as a center activity for practice.

Name _____ Date _____

Number Scramble

Task Directions: Cut out the number boxes at the bottom of the page by cutting on the black lines. Use the numbers to complete each task.

1. Make the largest whole number possible using 9 different tiles. Write your answer as directed below.

   Standard Form _____

   Expanded Form_____

2. Make the smallest whole number possible using 9 different tiles. Write your answer as directed below.

   Standard Form _____

   Expanded Form_____

3. Make a number larger than two million with a six in the ten-thousands place.

   What is your number? _____

   Expanded Form_____

4. Make a number smaller than five million with a two in the thousands place.

   What is your number? _____

   What is your partner's number? _____

   Expanded Form_____

5. Look carefully at your answers to Questions 1 and 2. Find one digit that is in BOTH of your answers. Write it here. _____
   How does the value of this digit change from the way you used it in Question 1 to the way you used it in Question 2? On the back of this sheet, use complete sentences to explain how and why the value of the digit did or did not change between the two answers.

0	1	2	3	4	5	6	7	8	9

Practice Task: Ticket Master

TASK CONTENT: In this task, students order and compare 6-digit numbers found on preprinted ticket stubs. They will place them in ascending and/or descending order. Then they will compare two numbers using a greater than (>), less than (<), or equal to (=) symbol.

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE TO BE EMPHASIZED

2. Reason abstractly and quantitatively.
4. Model with mathematics.
6. Attend to precision.

BACKGROUND KNOWLEDGE

Students should have had prior experiences and/or instruction with ordering large numbers. This activity may be used as an assessment or as an independent follow-up activity for reinforcement or review

ESSENTIAL QUESTIONS

- How can we compare large numbers?
- What determines the value of a number?
- Why is it important for me to be able to compare numbers?

MATERIALS

- Tickets
- Paper bag
- "Ticket Master" Recording Sheet

GROUPING

Partner Task

NUMBER TALKS

Please refer to pgs. 272-275 in *Number Talks* by Sherry Parrish for more examples of number talks that will further develop this strategy.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students order and compare 6-digit numbers found on preprinted ticket stubs. They will place them in ascending and/or descending order. Then they will compare two numbers using a greater than (>), less than (<), or equal to (=) symbol.

Comments

Part 1

Paper bags with tickets inside should be prepared ahead of time. You can purchase tickets at an office supply store or ask for a donated roll of tickets from activities that use them (raffles, bingo nights, school plays, etc.). If purchasing or donations are not an option, you can use the master provided in this task to print tickets. Tickets should be the style that has a duplicate attached to each ticket. For this activity, ten tickets and their duplicates will be used. Detach and separate one set of ten tickets, but keep the duplicates attached to each other for students to use as an answer key. Place the ten separated tickets and one string of attached duplicate tickets inside a paper bag. You may want to laminate the tickets or print them on card stock for future use.

Part II

Students will need a bag of 20 detached tickets for Part II of this task. It may be advantageous to have separate plastic bags of 20 tickets for this game so that the detached tickets that match the string of attached tickets in Part 1 will not be mixed up.

Task Directions

Part I

Students will follow the directions below from the "Ticket Master" Recording Sheet.

- Open the bag of tickets and pour them out on your desk. You will find 10 detached tickets and one string of 10 tickets that has not been detached.
- Place the attached tickets to the side, face down.
- Take the detached tickets and arrange them in either descending or ascending order.
- Once you have completed this task, have a friend use the attached tickets to check your answers.

Part II

Play the game "Dare to Compare."

Players: 2 players
Materials: One bag of 20 detached tickets "Dare to Compare" student recording sheet
pencil

Directions:

1. Each player places a pile of 10 tickets face down in front of them.
2. For each round, both players turn the top ticket in their piles face up and lay them on the table next to each other.

3. The player with the larger number on the ticket must correctly read aloud the number.
4. Both players record an inequality or equality statement using the numbers on the tickets.
5. The player with the higher number gets to keep both tickets and place them in a separate pile with the tickets face up.
6. At the end of ten rounds, the player with the most tickets wins.

FORMATIVE ASSESSMENT QUESTIONS

- Explain your process for sorting your numbers?
- How can you tell which number is the largest or smallest?
- What do you do if two tickets have numbers with the same values?
- How could a place value chart help you order the numbers?
- What symbol would be appropriate to compare these two numbers? How do you know?

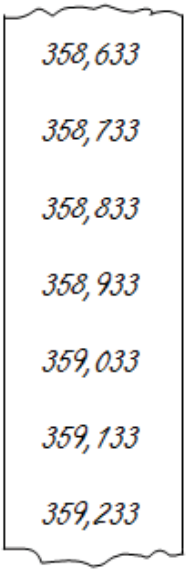
DIFFERENTIATION

Extension

- Create ticket strips (using the blank strip provided) that do not have sequential numbering. Have students practice putting in order-varied numbers, including numbers with fewer or more digits in them.

Intervention

- Have students use tickets with fewer digits in each number.
- Allow students to use a blank place value chart and write the numbers in the chart, showing the correct placement of the digits. This cueing device may assist students in comparing digits in the same place in order to determine value.



TECHNOLOGY CONNECTIONS

- http://real.doe.k12.ga.us/content/math/destination_math/msc3/msc3/msc3/MSC3/MSC3/Module1/Unit1/Session2/Tutorial.html This tutorial session involving comparing and ordering large numbers can be used as an introduction to a concept or as remediation for struggling learners.
- http://www.prometheanplanet.com/en-us/Resources/Item/93852/compare-whole-numbers-to-the-millions This interactive flipchart lesson on comparing whole numbers, can be used n used with your ActivSlate or Smartboard. It can be used in whole group, small group or student led centers.

- http://www.aaamath.com/cmp.htm This online activity has students comparing large numbers and determine their placement in a series of numbers. It can serve as a center activity for practice.

Name _____ Date _____

Ticket Master

Part I

- Open the bag of tickets and pour them out on your desk. You will find 10 detached tickets and one string of 10 tickets that has not been detached.
- Place the attached tickets to the side, face down.
- Take the detached tickets and arrange them in either descending or ascending order.
- Once you have completed this part of the task, have a friend use the attached tickets to check your answers.

	My Ticket Number		**My Partner's Ticket Number**
Ex.	358,033	>	354,033
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Part II
Play the game "Dare to Compare."
Players: 2 players
Materials: One bag of 20 detached tickets, "Dare to Compare" student recording sheet, and pencil

Directions:
1. Each player places a pile of 10 tickets face down in front of them.

2. For each round, both players turn the top ticket in their piles face up and lay them on the table next to each other.

3. The player with the larger number on the ticket must correctly read aloud the number.

4. Both players record an inequality or equality statement using the numbers on the tickets.

5. The player with the higher number gets to keep both tickets and place them in a separate pile with the tickets face up.

6. At the end of ten rounds, the player with the most tickets wins.

Master Sheet for Tickets

365,344	365,345	365,346	365,347	365,348	365,349	365,350	365,351	365,352	365,353	365,344	365,345	365,346	365,347	365,348	365,349	365,350	365,351	365,352	365,353	365,344	365,345	365,346	365,347	365,348	365,349	365,350	365,351	365,352	365,353

Constructing Task: Nice Numbers

TASK CONTENT: In this task, students use estimate to add and subtract quantities.

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

MCC4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.

MCC4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

STANDARDS FOR MATHEMATICAL PRACTICE TO BE EMPHASIZED

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
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

According to Van De Walle, to round a number simply means to substitute a "nice" number that is close so that some computation can be done more easily. The close number can be any nice number and need not be a multiple of ten or one hundred. It should be whatever makes the computation or estimation easier or simplifies numbers sufficiently in a story, chart, or conversation. (*Van de Walle, Elementary and Middle School Mathematics, 2010*)

ESSENTIAL QUESTIONS

- What is a sensible answer to a real problem?
- What information is needed in order to round whole number to any place?
- How can I ensure my answer is reasonable?
- How can rounding help me compute numbers?

MATERIALS

- Nice Numbers recording sheet

- Empty number lines
- Blank number lines labeled in different ways

GROUPING

Partner or small group

NUMBER TALKS

You may wish to explore the multiplying up strategy discussed on pgs. 293-297 in *Number Talks.* Using what students already know about place value and what happens to a number when they multiply it by 10, they can begin multiplying the divisor by 10, 20, 30 etc. until the find a "nice number" close to the dividend.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comments: For addition and subtraction problems involving only two terms, one strategy is to round only one of the two numbers. For example, you can round only the subtracted number as in 2367-1678 becomes 2367-1700. Rounding to "nice" numbers depends on what the estimator considers "nice". The point is that are no rigid rules. Choices depend on the relationships held by the estimator, on how quickly the estimate is needed, and how accurate an estimate needs to be.

Task directions:
Students will follow the directions below from the "Nice Numbers" recording sheet.

What is the approximate value of this coin collection? Justify your answer.

The most popular boy band is coming to town for a concert. The concert tickets cost $39.95. Parking at the arena cost $15. About how much will you pay to attend the concert? How do you know?

Robert and his family traveled from Atlanta, Georgia to Washington D.C. to visit the Martin Luther King Monument. They traveled a total 648 miles. It took them a total of 9 hours to get to Washington, D.C. If they traveled the same route back to Georgia, about how many miles would they drive? Explain your answer.

For the previous problem, determine the exact mileage for Robert's family's trip. Based on your estimation, is your answer reasonable? Explain.

FORMATIVE ASSESSMENT QUESTIONS

- What is the problem asking you?
- Does your answer make sense? How do you know?
- How does rounding help you in this context?

DIFFERENTIATION

Extension

- Plan a family trip, then estimate and calculate the mileage.

Intervention

- Provide students with a number line with a range of numbers noted.

TECHNOLOGY CONNECTIONS

- http://www.bbc.co.uk/skillswise/topic/rounding-and-estimating This resource starts with descriptions and examples, moves along to quizzes and practice sheets.
- http://www.prometheanplanet.com/en-us/Resources/Item/99649/rounding This lesson can be used as a review of the concept of rounding relating to the 3rd grade standard 3.NBT.1. It can serve as a mini-lesson prior to completing this task or an entrance

Name _____ Date_____

Nice Numbers

Directions

What is the approximate value of this coin collection? Justify your answer.

The most popular boy band is coming to town for a concert. The concert tickets cost $39.95. Parking at the arena cost $15. About how much will you pay to attend the concert? How do you know?

Robert and his family traveled from Atlanta, Georgia to Washington D.C. to visit the Martin Luther King Monument. They traveled a total 648 miles. It took them a total of 9 hours to get to Washington, D.C. If they traveled the same route back to Georgia, about how many miles would they drive? Explain your answer.

For the previous problem, determine the exact mileage for Robert's family's trip. Based on your estimation, is your answer reasonable? Explain.

Constructing Task: Estimation as a Check

TASK CONTENT: Before students attempt this task, they should have had opportunities to work with various contexts which required rounding to determine a reasonable answer. Students should be comfortable using place value concepts within their explanation of a rounded answer.

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

MCC4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.

MCC4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

STANDARDS FOR MATHEMATICAL PRACTICE TO BE EMPHASIZED

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
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 order for students to be able to round accurately, "rounding should be flexible and well understood conceptually" (Van de Walle, 246). In order for students to conceptually understand rounding, they must be engaged in contexts to allow them to make sense of this concept. This task provides several contexts in which students will have to determine the best estimation for the situation. With these estimations, students will use the most familiar form of estimation, rounding (Van de Walle, 241).

When students use the standard written forms or use a calculator, it is essential that they demonstrate good number sense in rejecting answers that are obviously wrong.

ESSENTIAL QUESTIONS

- What is a sensible answer to a real problem?
- What information is needed in order to round whole number to any place?
- How can I ensure my answer is reasonable?
- What effect does a remainder have on my rounded answer?

MATERIALS

- Estimation as a Check recording sheet
- Empty number lines

GROUPING

Partner or small group

NUMBER TALKS

The number talks strategies teaches student how to find an exact answer. However, the adding up in chunks strategy discussed on pgs. 201-204 of Sherry Parrish's *Number Talks* would help some students see how to make estimations and reasonable answers prior to making their calculations.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comments: Before students attempt this task, they should have had opportunities to work with various contexts which required rounding to determine a reasonable answer. Students should be comfortable using place value concepts within their explanation of a rounded answer. Through context problems, students should have concluded a reasonable rounded answer is based on the context of the situation and not rules or procedures for rounding.

Task directions:
Students will follow the directions below from the "Estimation as a Check" recording sheet.

Problem: To work out 4,567 + 4,890, Maureen uses her calculator or pencil and paper.
Her answer is 8,457. Is Maureen's answer correct? Show how you know.

FORMATIVE ASSESSMENT QUESTIONS

- What is the problem asking you?
- Does your answer make sense? How do you know?
- How does rounding help you in this context?

DIFFERENTIATION

Extension
- Discuss whether these answers are definitely wrong or not: 2,365 + 7,694 = 10,059; 1,788 – 891= 497

Intervention
- Adjust the numbers in Maureen's problem to include three-digit numbers.
- Provide students with a number line with a range of numbers noted.

TECHNOLOGY CONNECTIONS

- http://studyjams.scholastic.com/studyjams/jams/math/problem-solving/psestimate-whole-numbers.htm This resource is an activity with 5-10 multiple choice questions asked in a variety of ways. It can be used as a form of assessment.

Name _____ Date_____

Estimation as a Check

Directions

Problem: To work out 4,567 + 4,890, Maureen uses her calculator or pencil and paper.
Her answer is 8,457. Is Maureen's answer correct? Show how you know your answer is correct.

CONSTRUCTING TASK: Making Sense of the Algorithm

Adapted from: A Written Form of Subtraction, nzmaths, Adding, Subtraction , and Place Value

TASK CONTENT: This task allows students to make sense of the standard algorithm for subtraction.

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

STANDARDS FOR MATHEMATICAL PRACTICE TO BE EMPHASIZED

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
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

For students who are good at multi-digit addition and subtraction, learning a standard written subtraction is straightforward, provided they understand the core idea that the particular decomposition needed in a given subtraction depends on what is subtracted.

ESSENTIAL QUESTIONS

- What strategies can I use to help me make sense of a written algorithm?

MATERIALS

- Play money if needed
- Base-ten blocks
- Making Sense of the Algorithm recording sheet

GROUPING

Individual or partner

NUMBER TALKS

Number Talks doesn't explicitly teach any algorithms, however, many of the talks are crafted in a way that students could gain a better understanding the standard algorithm. For example, the removal strategy discussed on 212-216, as well as the place value and negative number strategy on

pgs. 218-220, both help students develop the concept of regrouping. The place value and negative number strategy prepare them for middle school and reinforce the idea that you can subtract a large number from a smaller one. (Number Talks, 2010, Sherry Parrish).

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comments:
This task allows students to make sense of the standard algorithm for subtraction. It is important you allow them to grapple with the strategies used by Jane. Through this grappling, students make sense of what Jane did to solve each problem. Through classroom discussion, student understanding will be shared and developed. Therefore, it is not necessary to work them through the methods presented in Jane's work.

After engaging in this task, students should know that it is mathematically possible to subtract a larger number from a smaller number but the difference would result in a negative number.

Task directions:
Students will follow the directions below from the "Making Sense of the Algorithm" recording sheet.

Problems:
1. "To work out 856 – 138, Jane rearranges 856 as 800 + 40 + 16. Why does she do this?" Explain, using play money, if necessary. *(In the decomposition method of subtraction, there are sufficient hundreds and tens to solve the problem, but there are insufficient ones.)* "So find 856 – 138."
2. "To work out 856 – 162, Jane rearranges 856 as 700 + 150 + 6. Why does she do this?" Explain, using play money, if necessary. *(In the decomposition method of subtraction, there are sufficient hundreds and ones to solve the problem, but there are insufficient tens.)* "So find 856 – 162."
3. "To work out 856 – 168, Jane rearranges 856 as 700 + 140 + 16. Why does she do this?" Explain, using play money, if necessary. "So find 856 – 168."
4. "To work out 856 – 123, Jane does not have to rearrange 856 at all. Why not?" Explain, using play money, if necessary. "So find 856 – 123."

Now establish a standard written form for subtraction. A good way to do this is to explain why 546 – 278 require 546 to be renamed 4 hundreds + 13 tens and 16 ones and link this to the problem below.

$$\begin{array}{r} \overset{13}{\cancel{4}\,\cancel{14}\,16} \\ \cancel{5}\cancel{4}\cancel{6} \\ -278 \\ \hline 268 \\ \hline \end{array}$$

FORMATIVE ASSESSMENT QUESTIONS

- When you write the numbers in expanded form, what do you discover?
- What happens when one number has more or less tens than the other?
- Why do you think Jane rearranged the numbers before subtracting?

DIFFERENTIATION

Extension

- In each of these subtractions, explain how to split up 953 to solve the problem, then find the answers: 953 – 234; 953 – 184; 953 – 594; 953 – 284; 953 – 388 ...

Intervention

- Have students model Jane's methods using play money or base ten blocks.

TECHNOLOGY CONNECTIONS

http://learnzillion.com/lessons?utf8=%E2%9C%93&filters%5Bsubject%5D=math&query=&filters%5Bgrade%5D%5B%5D=3&filters%5Bdomain%5D=NBT%3A+Number+and+Operations+in+Base+Ten&filters%5Bstandard%5D=3.NBT.2%3A+Fluently+add+and+subtract+within+1000...
While these lessons target 3rd grade standards, they provide foundational understanding for mastery of 4.NBT.4

Name _____ Date_____

Making Sense of the Algorithm

Directions

Problems:

1. "To work out 856 – 138, Jane rearranges 856 as 800 + 40 + 16. Why does she do this?" Explain, using play money or base ten blocks, if necessary.

2. "To work out 856 – 162, Jane rearranges 856 as 700 + 150 + 6. Why does she do this?" Explain, using play money or base ten blocks, if necessary.

3. "To work out 856 – 168, Jane rearranges 856 as 700 + 140 + 16. Why does she do this?" Explain, using play money or base ten blocks, if necessary.

4. "To work out 856 – 123, Jane does not have to rearrange 856 at all. Why not?" Explain, using play money or base ten blocks, if necessary.

Now establish a standard written form for subtraction. A good way to do this is to explain why 546 – 278 requires 546 to be renamed 4 hundreds + 13 tens and 16 ones and link this to the problem below.

$$\begin{array}{r} {\scriptstyle 4\ \ 13\ \ 16} \\ \cancel{5}\cancel{4}\cancel{6} \\ -278 \\ \hline 268 \\ \hline \end{array}$$

Constructing Task: Reality Checking

TASK CONTENT: This task provides a real world connection for students to apply the addition and subtraction strategies which help them explain the standard algorithm.

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

MCC4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.

MCC4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE TO BE EMPHASIZED

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
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

When students begin using the standard algorithm their explanation may be quite lengthy. After much practice with using place value to justify their steps, they will develop fluency with the algorithm. Students should be able to explain why the algorithm works. Often students mix up when to 'carry' and when to 'borrow'. Also students often do not notice the need of borrowing and just take the smaller digit from the larger one. Emphasize place value and the meaning of each of the digits.

ESSENTIAL QUESTIONS

- How can I combine hundreds, tens and ones in two or more numbers efficiently?
- What strategies help me add and subtract multi-digit numbers?
- How does the value of digits in a number help me compare two numbers?
- How can I round to help me find a reasonable answer to a problem?
- How does understanding place value help me explain my method for rounding a number to any place?

MATERIALS

- Hundreds chart or number line
- Reality Checking recording sheet

GROUPING

Individual or partner

NUMBER TALKS

In addition to standards algorithms, students could use a number of strategies to accomplish this task. Various number talks could be found in chapter 6. (Number Talks, 2010, Sherry Parrish).

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comments: This task provides a real world connection for students to apply the addition and subtraction strategies which help them explain the standard algorithm. Students will engage in the balancing of a mock checking account register. Students will add whole number deposits and subtract whole number withdrawals using addition and subtraction strategies such as, place value or the standard algorithm. Students will be required to explain how their understanding of place value helped add and subtract the given amounts.

Within their explanations, students should use language noting the number of hundreds, tens and ones combined and/or separated in order to determine the final balance in the register. Students will also be required to compare the amounts in the banking statement and the register for accurate balancing of the checking account.

A context problem is included to encourage students to think about the reasonableness of their answers. Students will round the determined amount based on the context, it will be important to keep students grounded in the context. Encourage them to round based on the context and not apply a procedure for rounding.

Task directions:

Students will follow the directions below from the "Reality Checking" recording sheet.

Part 1:

1. First finish subtracting the checks and adding the deposit in the check register.
2. First check off each check and deposit that are in the **check register** and checking statement from Reality Bank. This will tell you which checks and deposits cleared the bank. The check goes underneath the column that has the check in your register.
3. Write down the checks that are i**n the check register and not in the bank statement**. Add up all of these checks. This tells you what checks you wrote but are still outstanding from the bank.

4. Subtract this sum from your **ending balance** on your statement.
5. Add to this balance (line 4) any **deposits** that weren't checked off. The answer that you get here should match the last balance from your check register.

Part 2:

After balancing her check register above, Marsha realized she did not include a check she received for her birthday from her grandmother. She remembers depositing the check in the bank on March 29th close to closing time. However, she cannot remember the exact amount of the check. She believes it is between $125 and $130 dollars. About how much will her ending balance be when she includes the amount of her birthday check?

Part 3:

After taking a financial course to help her manage her money, Marsha decided to create a monthly budget. She used her March checking register to determine how much money she spent on food, bills like car payment, phone bill, and spending at her favorite stores. Help Marsha determine in which of the three areas she spends the most money and in which she spends the least. Use what you know about place value to explain which area uses most of her money and which area uses the least of her money.

FORMATIVE ASSESSMENT QUESTIONS

- Can you explain how you are subtracting the withdrawals from the balance? Explain how you are adding the deposits to the balance.
- What is the beginning balance in Marsha's register? What is the ending balance? Which is greater, the beginning balance or the end balance?
- How can you determine Marsha's new end balance after including the birthday check?

DIFFERENTIATION

Extension

- Have students create a monthly budget for Marsha based on her March spending.

Intervention

- Have students use the hundreds chart or number line to aid in rounding the amount of the birthday check and new ending balance.
- Provide students with more entries for the register to require limited addition and subtraction opportunities.
- Have base-ten blocks available to help students formulate their thoughts about using place value to help add and subtract the deposits and withdrawals.

TECHNOLOGY CONNECTIONS

- http://learnzillion.com/lessons?utf8=%E2%9C%93&filters%5Bsubject%5D=math&query=&filters%5Bgrade%5D%5B%5D=4&filters%5Bdomain%5D=NBT%3A+Number+and+Op

erations+in+Base+Ten&filters%5Bstandard%5D=4.NBT.2%3A+Read+and+write+multi-digit+whole+numb...

- http://learnzillion.com/lessons?utf8=%E2%9C%93&filters%5Bsubject%5D=math&query=&filters%5Bgrade%5D%5B%5D=4&filters%5Bdomain%5D=NBT%3A+Number+and+Operations+in+Base+Ten&filters%5Bstandard%5D=4.NBT.3%3A+Use+place+value+understanding+to+roun...
-

Name _____ Date_____

Reality Checking

Directions

Checking Statement
Reality Bank
March 1 - 30

Beginning Balance: $1234.00

Deposits $1800.00

Withdrawals $2095.00

Ending Balance: $939.00

Date	Check #	Amount	Balance
2- Mar	231	$300.00	934.00
2-Mar	Deposit	$890.00	1824.00
4-Mar	223	$45.00	1779.00
5-Mar	221	$35.00	1744.00
6-Mar	228	$450.00	1294.00
7-Mar	229	$56.00	1238.00
8-Mar	Deposit	$910.00	2148.00
10-Mar	239	$430.00	1718.00
13-Mar	225	$50.00	1668.00
15-Mar	226	$46.00	1622.00
19-Mar	237	$52.00	1570.00

23-Mar	222	$85.00	1485.00
25-Mar	232	$96.00	1389.00
28-Mar	236	$125.00	1264.00
28-Mar	224	$325.00	939.00

Check No.	Date	Description of Transaction	(-) Amount of Payment or Withdrawal	O T	(+ -) other	(-) Amount of Deposit or Interest	Balance 1234.00			
221	2/15	Mr. Jones	35	00					1199	00
222	2/15	Mrs. Wilkinson	85	00					1114	00
223	2/16	Phone	45	00					1069	00
224	2/18	Car Payment	325	00					744	00
225	2/18	Insurance	50	00					694	00
226	2/20	Dr. Norris	46	00					648	00
227	2/21	Groceries	24	00					624	00
Dep	2/24	Paycheck					890	00	1514	00
228	2/26	Rent	450	00						
229	2/26	Groceries	56	00						
230	2/28	Wal-Mart	10	00						

231	2/28	K-mart	300	00						
232	2/28	Dining	96	00						
233	2/28	Cable	23	00						
234	2/28	Pizza	9	00						
235	3/1	Water	23	00						
Dep	3/1	Paycheck					910	00		
236	3/1	Books	125	00						
237	3/2	Dining	52	00						
238	3/2	Groceries	83	00						
239	3/2	Visa	430	00						
Dep	3/5	Paycheck					1123	00		

Part 1:
First finish subtracting the checks and adding the deposit in the check register.

1. First put a check mark by each check and deposit that are in the **check register** and checking statement from Reality Bank. This will tell you which checks and deposits cleared the bank. The check mark goes underneath the column that has the check in your register.
2. Write down the checks that are **in the check register and not in the bank statement**. Add up all of these checks. This tells you what checks you wrote but are still outstanding from the bank.

_____ _____

_____ _____

_____ _____

_____ Total: _____

3. Subtract this sum from your **ending balance** on your statement.

_____-_____=_____

4. Add to this balance (line 4) any **deposits** that weren't checked off. The answer that you get here should match the last balance from your check register.

_____+_____=_____

5. Explain how you balanced the equation in problem #5. Use what you know about place value to help you explain how you added the two amounts to make it equal the ending balance in the checking statement.

Part 2:

After balancing her check register above, Marsha realized she did not include a check she received for her birthday from her grandmother. She remembers depositing the check in the bank on March 29th close to closing time. However, she cannot remember the exact amount of the check. She believes it is between $125 and $130 dollars. About how much will her ending balance be when she includes the amount of her birthday check?

Part 3:

After taking a financial course to help her manage her money, Marsha decided to create a monthly budget. She used her March checking register to determine how much money she spent on food, bills like car payment and phone bill and spending on at her favorite stores. Help Marsha determine which of the three areas she spends the most money and which she spends the least. Use what you know about place value to explain which area uses most of her money and which area uses the least of her money.

CULMINATING TASK: It's in the Numbers!

TASK CONTENT: In this culminating task, students will collect data related to U.S. regional demographics, including population, precipitation, and area and use these data to draw conclusions about why people might choose to live there.

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

MCC4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

MCC4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.

STANDARDS FOR MATHEMATICAL PRACTICE TO BE EMPHASIZED

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.

BACKGROUND KNOWLEDGE

Students should have a thorough knowledge by this time of how to compare and order whole numbers. Students must be able to articulate how they know the sizes of digits in a given number and how to equate any number with its word form and/or expanded form. Students should know how to round to the nearest whole, ten, hundred, and thousand

ESSENTIAL QUESTIONS

- What kinds of things are large numbers used to measure?
- How can we tell which number among many large numbers is the largest or smallest
- How do people use data to make decisions in their lives?
- How does numerical data inform us when choosing a place to live?

MATERIALS

- "It's in the Numbers! Directions" Student Sheet
- "It's in the Numbers! Data Collection" Recording Sheet
- "It's in the Numbers! Questions" Recording Sheet
- Research materials
- Computers with Internet access
- Notebook paper

GROUPING

Individual Task

NUMBER TALKS

This task allows for review of several number talks strategies. Revisit chapter 8 of Number Talks, by Sherry Parrish, and explore the strategies most appropriate for your students, as well as any addition and subtraction strategies that seem applicable and appropriate.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this culminating task, students will collect data related to U.S. regional demographics, including population, precipitation, and area and use these data to draw conclusions about why people might choose to live there.

Comments

This task is intended to serve as a summative assessment. A sample rubric has been provided to support the use of this task as a culminating performance assessment. Students should be given a copy of the rubric as part of the teacher introduction to the assessment so they are aware of the rigor and quality of work that is expected. This task is appropriate to use in a variety of ways, including:

- Peer Review
- Display for parent night
- Portfolio

Task Directions

Students will follow the directions below from the "It's in the Numbers!" Recording Sheet.

> Your job is to work on a committee to compare life in different regions of the United States. People will use your information when deciding in which part of the country they want to live.

FORMATIVE ASSESSMENT QUESTIONS

- What is the best way to organize your research?
- When comparing numbers how can you check to be sure that the comparisons are correct?

- What strategy for rounding works best for you? Can you demonstrate and explain it to me or another classmate?
- Explain how you know the value of multi-digit number.
- What do the numbers in your chart tell you about a particular region?

DIFFERENTIATION

Extension

- Activities such as these lend themselves to extended exploration of analyzing data using whole to compare further U.S. demographics and/or countries all over the world. An additional website is offered for the purpose of extending student understanding: http://money.cnn.com/magazines/moneymag/bplive/2007/

Intervention

- Help students organize the task and break it into smaller steps.
- Limit the number of student choices in terms of states or research resources to help them use their time wisely.
- Limit the number of regions (not less than three) so students will be able to round and compare sufficient data while avoiding getting bogged down in the research process.

TECHNOLOGY

Please refer to the technology links within the previous lessons.

Name _____ Date _____

It's in the Numbers!

Directions

Your job is to work on a committee to compare life in different regions of the United States. People will use your information when deciding in which part of the country they want to live.

Step 1:

- Choose one state from each of the seven geographic regions of the country. Examples of possible states in each region are listed. Use the resources provided to decide which state you will research.
- The geographic regions are:
  - New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island
  - Mid-Atlantic: Delaware, Maryland, New Jersey, New York, Pennsylvania
  - Southeast: Florida, Georgia, North Carolina, South Carolina, Alabama
  - Midwest: Illinois, Iowa, Indiana, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin
  - Rocky Mountain: Colorado, Idaho, Montana, Nevada, Utah, Wyoming
  - Southwest: Arizona, California, New Mexico, Texas
  - Northwest: Alaska, Oregon, Washington

Step 2:

- Using appropriate resources, record the information required to complete your data chart.
- Resources such as the Internet, Atlases, Almanacs, and Encyclopedias provide excellent current data.
- Suggested websites for Internet research include:
  - http://www.census.gov/schools/facts/
  - http://www.ers.usda.gov/statefacts/
  - http://www.statemaster.com/index.php
  - http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/nrmlprcp.html
  - http://www.allcountries.org/uscensus/411_normal_monthly_and_annual_precipitation_selected.html

Step 3:

- Answer the questions provided using the data charts on your own notebook paper. Explain your answers thoroughly using complete sentences and correct math vocabulary.

Name _____ Date_____

Region	State	Population	Precipitation	Size
			In inches (use whole numbers)	In square miles (use whole numbers)
New England				
Mid-Atlantic				
Southeast				
Midwest				
Rocky Mountain				
Southwest				
Northwest				

Name _____ Date _____

It's in the Numbers!

Questions

1. If someone wanted to live in a region with a large population, which region would you recommend to them and why?

_____

_____

_____

2. If someone wanted to live in a region that didn't rain much, which region would you recommend to them and why?

_____

_____

_____

3. If someone wanted to live in a region that had lots of space in which to move around without a lot of people, which region would you recommend to them and why?

_____

_____

_____

4. Which two regions seem most like each other? How do you know?

_____

_____

_____

5. Write <u>all</u> of the exact data for one state in expanded form and word form.

_____

_____

_____

6. In which region would you prefer to live? Explain why, using the data you collected.

_____

_____

_____

_____

_____

4th Grade Math Unit 1 Performance Assessment RUBRIC

Standard ↓	Exceeding	Meeting	Not Yet Meeting
MCC4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding	Student explanation gives thorough description of numbers involved, the relative size of those numbers in relation to other, and how the number might impact a person's decision to live in that region.	Student explanation in regards to precipitation demonstrates an understanding of the relative size of various numbers.	Student response shows an inability to accurately equate standard form with either word name or expanded form or both.
MCC4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	Student response shows all correct word and/or expanded form for whole numbers	Student responses have minor errors in word and/or expanded form for whole numbers.	Student response has errors in word and/or expanded form for whole numbers.
MCC4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.	A student response shows all numbers are rounded to the nearest whole number correctly.	Student responses have minor errors in rounding whole numbers.	Student response has errors in whole number rounding and expands forms.