Unit 1: Domain Operations and Algebraic Thinking

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Marking Period 1**
Length: **7-8 Weeks**
Status: **Published**

Unit Overview

In this unit students will use addition and subtraction within 100 to solve one and two step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions by using drawings and equations with a symbol for unknown numbers to represent the problem.

Standards

MA.2.OA.A.1	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
MA.2.OA.B.2	Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.
MA.2.OA.C.4	Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.
MA.2.NBT.B.5	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
MA.2.NBT.B.6	Add up to four two-digit numbers using strategies based on place value and properties of operations.
MA.2.NBT.B.9	Explain why addition and subtraction strategies work, using place value and the properties of operations.

Essential Questions

- What is addition?
- How do patterns and strategies help you to solve problems?
- How is adding two numbers different from adding three numbers?
- How is subtraction different from addition?
- What is a fact family?
- How is subtraction related to addition?
- How can you compare and order numbers?

Application of Knowledge and Skills...

Students will know that...

- for a given set of numbers there are relationships that are always true, called properties and these rules govern arithmetic and algebra
- mathematics content and practices can be applied to solve problem.
- numbers, expressions, measures and objects can be compared and related to other numbers. expressions, measures and objects in different ways
- there are multiple interpretations of addition, subtraction, multiplication and division of rational numbers.
- there is more than one algorithm for each of the operations with rational numbers.

Students will be skilled at...

- adding 3 digit numbers
- building arrays
- connecting addition and subtraction
- model stories about joining, separating and comparing numbers
- using doubles, making a ten, highest number strategies to solve problems
- using repeated addition
- writing addition number sentences.
- writing subtraction number sentences

Assessments

- basic facts timed tests
- benchmark tests
- end of year test- administered after completing program
- Placement Test- administered prior to delivering program
- task cards
- topic math projects
- topic quick check
- topic tests

Activities

Problem of the Day-Present a daily problem that serves as a review from the previous day's lesson.

Vocabulary - Have students create a chart for each new vocabulary word that includes the word's meaning and an example or use vocabulary cards as flash card game

Station activities- Each section has center activities to reinforce skill (leveled)

- Clip and Cover: Students answer questions and try to cover four spaces in a row on a gameboard to win.
- Display the Digits: Students answer the problem and display the tile that rpresents the answer.
- Quick Questions: Toss number cubes and answers questions.
- Teamwork: Students in turn explain the steps in a multi-step process.
- Think Together: Students choose and discuss answers to problems.
- Tic Tac Toe: Students use algebraic rules to compute solutions to problems
- Toss and Talk: Students toss number cubes and explain how to solve resulting problems.

STEM - Certain sections have Going Digital integrating technology and the use of calculators such as:

- Solving Addition Problems p.30
- Building Arrays p. 116

Interactive Learning - Problem-Based Interactive learning activities at the beginning of each topic such as using tools, structure,reasoning, generalizing, assessing reasonableness and modeling.

Topic Opener Projects - There is a math project for each topic (Topic 1-4). See Cross Disciplinary instruction for project and page numbers.

Practice work - Communicator practice can be done using Independent work and problem- solving practice problems in each section.

Ticket to Leave - Quick Checks on each sections

Activities to Differentiate Instruction

General strategies for modification of this curriculum for students with special needs, ELL, and gifted learners:

- **General strategies:**

    - preferential seating
    - manipulatives
    - modified workbook pages
    - practice or enrich homework pages
- **Center activities** - There are leveled center activities for each section. There is a separate activity for "Intervention", and then "On-Level" and "Advanced" are in spiral book.
- **Leveled practice pages** - There are three leveled (Reteaching, Practice, and Enrichment) sheets that can be used for practice or homework.
- **Math Concept Readers:** These readers allow the student to read the story at different levels- above level, on level, and below level. (also available on line with audio) Complete the Think and Respond and Write Math questions at the conclusion of each book.
- **Assessment**- Using Quick Check Review can determine differentiated instruction levels using sample answers and using the rubric at the Close/ Assess and Differentiate section in the teacher edition.

Content specific modification for students with special needs, ELL, and gifted learners:

- **Topic 1:**
    - **Below level students:**
        - Encourage children to use their instincts when they believe they have been presented with extra information in story problems. Children should feel comfortable taking a little longer to check the information being presented against the question being asked.
        - Children may need assistance in "mapping" story problems. Read aloud problems line by line with children to identify any given totals, parts, and missing parts.
    - **Students with special needs:**
        - Allow children to use different colored connecting cubes to mimic the quantity of objects described in joining, separating, and comparing story problems. While some children will only feel comfortable counting actual objects, encourage them to also begin visualizing when counting.
        - Provide children with plenty of practice writing number sentences. On a daily basis, review the different operation symbols and their correct placement in number sentences.

    - **ELL**
        - **Emerging:** Be sure to discuss the ways addition or subtraction are indicated, such as the use of join and more in exercises that require children to add.
        - **Expanding:** Prompt children to match words with operation symbols as they draw part-part-whole models and write number sentences. Increased familiarity with symbols will help children become more comfortable with both the language and processes of addition and subtraction.
        - **Bridging:** The irrelevance of extra information in many story problems may be less obvious to English language learners. Remind children to pay careful attention to the information in problems, and to confirm words that seem unrelated.

    - **Advanced/Gifted:**
        - By the middle of the topic, encourage children not to use only objects when a problem is unusually difficult. At this point, they should be able to rely more on part-part-whole models and mental math to complete number sentences.
        - Pairs of children who quickly grasp the concepts in the topic may enjoy writing addition and subtraction number sentences without the operations symbols. One partner writes a sentence and the other partner writes the symbols to complete the sentence.

- **Topic 2:**
    - **Below level students:**

- Some children may need continued practice using the strategies in this topic to solve easier addition facts, such as those with sums to 12. Repeated work with these easier facts may help children apply the strategies to problems with larger sums.
- Provide children performing below level with numerous opportunities to practice their basic addition facts - through flash cards, games, and manipulatives.

- **Students with special needs:**
  - Review with special needs students how to solve addition facts with smaller sums using the strategies in this topic.
  - Some children may have difficulty understanding how to use the strategies. Physically solving problems using cubes, dominoes, or a ten-frame with counter may help.
  - Some children may benefit from practicing only a few facts at a time. When facts are mastered, practice new facts.

- **ELL**
  - **Emerging:** Ask children to name real-world things that are doubles, such as shoes, eyes, etc. List the doubles on the board.
  - **Expanding:** Show children number cards that have doubles addition problems. Have the children say each addition sentence, model it with manipulatives, write it, and solve it.
  - **Bridging:** Explain that near doubles are doubles plus one more. Show children number cards that are doubles and near doubles. Have them name the addition number sentence. Children may also create their own simple word problems using doubles and near doubles to post to their peers.

- **Advanced/Gifted:**
  - Children who have already memorized the addition facts can benefit from opportunities to solve addition problems with multiples of tens or hundreds, such as 90+ 90 or 400 + 300.
  - Children who have hider-order thinking skills should also be encouraged to help solve real-world addition problems related to the classroom.

- **Topic 3:**
  - **Below level students:**
    - Children will use doubles facts to help them complete subtraction problems. It is important for them to know their doubles fats.
    - Provide children performing blow level with numerous opportunities to practice basic doubles facts - through flash cards, drawings, and games.
  - **Students with special needs:**
    - Work with special needs students to help them discover and record related doubles facts.
    - Encourage children to share what they learn about each related pair of doubles facts, giving children the opportunity to experience the fact in several modalities: tactile, visual, written, and oral.

  - **ELL**
    - Understanding and using terms in both math and everyday settings will help English language learners internalize math concepts.
    - **Emerging:** Point to a picture of a family and tell how different family members are related. Say: The mother is related to the son. Have children repeat after you.
    - **Expanding:** Write related on the board. Read the term and help the children come up with real world examples of people that are related.
    - **Bridging:** Write related on the board along with related addition and subtraction

sentences. Have children explain why they are said to be related.

- **Advanced/Gifted:**
  - Children who are easily able to identify number patterns can be further challenged by being given the opportunity to work with patterns and relationships in different forms.
  - Encourage children to notice how they use addition, subtraction, and missing numbers to complete a 3 by 3 magic square.

- **Topic 4:**
  - **Below level students:**
    - Encourage below-level students to use cubes, counters, or other concrete objects to model problems when possible. Ask them to explain what their models show.
  - **Students with special needs:**
    - Have children group tactile classroom objects (crayons, paper clips, erasers) into equal groups. Then have children count the groups to find how many objects in all.
    - On another day, repeat the activity above using a different group of objects and different numbers. Help children see the connection between repeated addition and the groups they create.
  - **ELL**
    - English language learners need repeated experiences with the vocabulary of addition.
    - **Emerging:** Model and write an addition sentence on the board. Point to each number in the sentence and ask children if the number is a sum. Then point to each number and ask if the number is an addend.
    - **Expanding:** Write an addition sentence on the board. Ask children to tell you which number is the sum. Ask them to tell you which numbers are the addends.
    - **Bridging:** Ask children to provide you with an addition sentence whose sum is 8 and whose addends are 3 and 5.
  - **Advanced/Gifted:**
    - Challenge children to find examples of repeated addition in their everyday lives. Children can find examples of arrays in the rows of a crayon box or on a photo album page.
    - Children who quickly grasp repeated addition concepts can concentrate on learning the repeated addition facts. Children may enjoy racing in small groups to call out the answers to flash cards.

Integrated/Cross-Disciplinary Instruction

Reading and Writing: The Worldscapes Readers present math problems to be solved within the context of nonfiction text. Think and Respond and Write Math questions can be found at the conclusion of the books.
Language Arts/Science/Social Studies:

- Worldscapes Readers
- Topic Opener Math Projects
- Writing in Math/Math Journals
- Interactive Notebooks

Topic 1: Rooster's Off to see the World: Social Studies: Discuss places people go on vacations. Have children write and illustrate addition/subtraction problems for their stories. p.2

Topic 2: Animals on Board: STEM: Discuss what children might see at a space center. Have them write a number story about the center. p. 36

Topic 3: Literature: Missing Mittens: Research interesting facts about an animal. Then have students writ an addition/subtraction story about their animal. p.70

Topic 4: What comes in 2's, 3's,& 4's? STEM: Students will research animals, plants or products of New Jersey. Ask them to make an array of one of the items and label it. p.100

Resources

Topics Categories in book form:

Topic 1: Understanding Addition and Subtraction

Topic 2: Addition Strategies

Topic 3: Subtraction Strategies

Topic 4: Working with Equal Groups

Master Enrichment pages

Master Reteaching pages

Master Practice pages

Student Edition workbook

On line Resources available at www.pearsonrealize.com

- Teacher Edition (TE) Textbook
- Student Edition (SE) Textbook
- Tests on line
- Concepts videos
- Math Tools

21st Century Skills

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.