Unit 2: Domain: Operations and Algebraic Thinking

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Marking Period 2**
Length: **6 Weeks**
Status: **Published**

Unit Overview

In this unit, the students will understand the effects of adding and subtracting whole numbers. Students will begin by adding and subtracting concrete objects and will progress to making symbolic representations with paper and pencil. Students will apply and adapt a variety of appropriate strategies to solve problems. Throughout, students will engage in methodologies to construct meaning that include: acting it out, use of manipulatives, pictures and symbols, paper and pencil, and using a model.

Standards

MA.K.CC.C.6	Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.
MA.K.OA.A	Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.
MA.K.OA.A.1	Represent addition and subtraction up to 10 with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.
MA.K.OA.A.2	Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.
MA.K.OA.A.3	Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).
MA.K.OA.A.4	For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.
MA.K.OA.A.5	Demonstrate fluency for addition and subtraction within 5.
MA.K.MD.B.3	Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.

Essential Questions

- What does it mean to add and/or subtract quantities?
- What are different models of/for addition and subtraction?
- What are efficient methods for finding sums and differences?
- What questions can be answered using addition and/or subtraction?

Application of Knowledge and Skills...

Students will know that...

- Any number, measure, numerical expression, algebraic expression or equation can be represented in many ways that have the same value.
- Mathematics content and practices can be applied to solve problems.
- There are multiple interpretations of addition, subtraction, multiplication and division of rational numbers and each operation is related to other operations.

Students will be skilled at...

- acting out stories about joining and separating two groups.
- define the following vocabulary word for each topic: Topic 7: in all, join, number story, altogether, plus sign, equal sign, add, sum, addition sentence Topic 8: separate, left, minus sign, take away, difference, subtract, subtraction sentence Topic 9: graph, whole, part
- determining how many there are when joining two groups together.
- interpreting illustrations that show joining groups and writing corresponding numbers.
- representing and writing numbers in two parts.
- utilizing the equal sign (=) when finding sums and differences.
- utilizing the symbols of adding (+) and subtracting (-) when recording addition and subtraction.
- writing and solving addition and subtraction sentences.
- writing number sentences that show how two numbers can add to 10.

Assessments

- benchmark test
- end of year test- administered after completing program
- Placement Test-administered prior to delivering the program
- 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 - 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 such as:

- Counter Math Tools p. 142

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 7-9) 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.

<u>Pairs that Make Ten</u>

Have two volunteers come to the front of the classroom and hold up a total of 7 books (for example, 4 and 3). Ask children to create number sentences about the books. Questions for discussion include:

- How many books are there?
- How do you know?
- How can the books be rearranged to show another number sentence?
- Do they still equal the same amount when arranged differently?

After several combinations of seven have been modeled, have children write one number sentence that has a

sum of seven and draw a picture to show a matching number story.

How Many are Left?

Provide pairs of children with seven construction paper cutouts of balloons. Tell a story about a balloon man who had seven balloons before two of them flew away. Ask children:

- How many balloons did the man start with?
- How many flew away?
- How many balloons were left?
- How many would he have if two more balloons flew away?

Have children make up other subtraction situations with their balloons. After several repetitions, have children draw a picture to show one of their subtraction stories and have them write the number sentence.

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 7**
  - **Below level students:**
    - It is important to help children make connections between the information they have and the new concepts and symbols being introduced. For example, connect "2 and 3 is 5" to "2 + 3 = 5"
    - Provide children performing below level with numerous opportunities to practice working with the + and = symbols so that they can easily differentiate between them.
  - **Students with special needs:**
    - Some children may have problems understanding addition concepts when written as

symbols. Review with children the symbols + and = and what they mean.

- **ELL**
  - Some children who have difficulty writing English may need extra practice working with the + and = symbols.
  - Write the addition sentence "3 + 4 = 7" on the board. Have children come to the board and circle the plus and equal symbols in te sentence, and say the words plus and equals as they circle them.
- **Advanced/Gifted:**
  - Students who quickly grasp how to write out addition sentences can learn to use this method for more complex math stories.
  - Encourage children to practice mental math by first thinking of the answers to addition stories in their heads and then writing the correct addition sentence on paper.

- **Topic 8:**
  - **Below level students:**
    - Help children make connections between the information they have and the new concepts and symbols being introduced. For example, connect "5 take away 3 is 2" to 5-3=2
    - Provide children performing below level with numerous opportunities to practice working with the "+" and "-" symbols so that they can easily differentiate between them.
    - Remind children that when they use _ they will have more than they started with; when they use - they will have less than they started with.
  - **Students with special needs:**
    - Some children may have problems understanding subtraction concepts when written as symbols. Review with children the symbols "-" and "=" and what they mean.
  - **ELL**
    - Some children who have difficult writing English need extra practice working with the "-" and "=" symbols..
    - **Emerging:** Write the subtraction sentence 8-3=5 on the board. Have children come to the board and circle the minus and equals symbols in the sentence and say the words minus and equals as they circle them.
    - **Expanding:** Write the symbols "-" and "=" on the board. Write the words minus and equals below the symbols. Have children draw lines to connect the word with the correct symbol and then repeat the words orally.
    - **Bridging:** Say a subtraction sentence, such as "7 minus 4 equals 3." Call on children to write the sentence on the board using the symbols "-" and "=."
  - **Advanced/Gifted:**
    - Children who quickly grasp how to write out subtraction sentences can learn to use this method for more complex math stories.
    - Encourage children to practice mental math by first thinking of the answers to subtraction stories in their heads and then writing the correct equations on paper.

- **Topic 9:**
  - **Below level students:**

        - Symbolic representation can be difficult for some children as they first learn to read and write addition sentences.
        - When saying a number sentence aloud, always write the number sentence on the board and model it with illustrations or manipulatives such as counters, connecting cubes, or classroom objects.
        - Provide ample opportunities for children to have hands-on activities to model addition number sentences on their own. Say number sentences slowly enough so that children can use the manipulatives at the appropriate time. For example: One (child picks up 1 counter) plus three (child picks up 3 more counters) equals four (child places 4 counters on desk).
    - **Students with special needs:**
        - The placement of counters within ten frames can be difficult for some special needs children. Provide larger ten frames for these children or allow them to work with a partner.
        - If a child consistently solves addition sentences that are presented verbally but has difficulty solving number sentences that are written or drawn, he or she may have difficulty seeing the written numbers of pictures. Remember to verbalize each number sentence and describe the pictures for these children. If you think a child may have an undiagnosed visual impairment, discuss the potential issue with a parent or guardian.

    - **ELL**
        - As mathematical concepts expand to include number sentences, it is important that English learners understand that numerical and operational symbols relate to words.
        - Write the addition sentence 2 + 3 = 5 on the board. As you say the following sentence aloud, underline each corresponding symbol in the number sentence. Two plus three equals five. Then have children repeat the words after you as you touch each symbol on the board.
    - **Advanced/Gifted:**
        - Challenge children to think algebraically. On the board, write addition number sentences with missing addends such as 4 +_ =6 or 5 = _ + 3. Have children write or say the number that belongs in each box
        - Have children compare addition expressions. For example, say I have some pennies. In one hand, I have 4 pennies that are heads and 2 pennies that are tails. In th other hand, I have 2 pennies that are head sand 5 pennies that are tails. Which hand has more pennies? Encourage children to draw pictures to help solve.

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 7: Little Quack: Music: Have students draw 2 rows of instruments. First row can have any number. Second row must have 2 more. Students will share and perform their drawings. p. 126

Topic 8: Splash: Social Studies: Discuss how trees change and grow. Then students will draw, and compare groups of trees with a partner. p. 146

Topic 9: Subtracting with Sebastian Pig and Friends on a Camping trip: Social Studies: Bring in a fruit that grows in New Jersey. Have students taste the fruit and chart results with a picture graph. Discuss results. p. 168

DRAMATIC PLAY

Beach Bucket Addition

Objective - Use a model to solve addition problems

Procedure - Spread shells randomly in the sand at the sand table. Have both partners collect several shells in their buckets. After all shells have been collected, partners count the shells and say addition sentences that tell how many shells are in both buckets. Return shells and repeat the activity several times.

LIBRARY CENTER

Take Away Reading

Objective - Recognize and model separating groups

Procedure - Have children work in pairs and give each duo a die. Have one child roll the die and take that number of books from the book shelf. The child should then give several of the books to his/her partner. The children then tell the subtraction story - how many books they had in all, how many were given away, and how many were left. Children exchange rolls and repeat the activity.

SCIENCE CENTER

Froggie Subtraction

Objective - Create and model addition and subtraction problems

Procedure - Give each pair of children five cutout frogs and a sheet of blue paper to represent a pond. Explain to the children that some frogs like to live on land, and others prefer water. Using the frog cutouts, have one child place some of the frogs in the pond and others on the land. Have children voice the two groups of frogs as if in an addition problem and then join all of the frogs together to arrive at a total. Next, have all of the frogs on land and then have some "jump' into the pond. Have students voice the action of some frogs leaving as a subtraction problem to determine how many frogs are left on land. Switch roles and repeat several times.

Resources

Topics Categories in book form:

Topic 7: Understanding Addition

Topic 8: Understanding Subtraction

Topic 9: More Addition and Subtraction

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.