Unit 1: Domain: Operations and Algebraic Thinking

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Marking Period 1**
Length: **4-5 Weeks**
Status: **Published**

Unit Overview

In this unit, students will use the four operations with whole numbers to solve problems. Students will interpret a multiplication equation as a comparison. Students will generalize and analyze patterns; generating a number or shape pattern that follows a given rule. They will identify apparent features of the pattern that were not explicit in the rule itself.

Standards

MA.4.OA.A.1	Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
MA.4.OA.A.2	Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
MA.4.OA.A.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.
MA.4.OA.C.5	Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.

Essential Questions

- How are multiplication and division expressions expressed?
- How can patterns help determine a rule?
- What strategies and patterns can you use to remember multiplication and division facts?
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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 are the rules that govern arithmetic and algebra
- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations
- Relationships can be described and generalizations made for mathematical situations that have numbers or objects that repeat in predictable ways. For some relationships, mathematical expressions and equations can be used to describe how members of one set are related to members of a second set
- There are multiple interpretations of addition, subtraction, multiplication, and division of rational numbers, and each operation is related to other operations
- There is more than one algorithm for each of the operations with rational numbers. Some strategies for basic facts and most algorithms for operations with rational numbers, both mental math and paper and pencil, use equivalence to transform calculations into simpler ones

Students will be skilled at...

- Extending patterns of cubes or tiles
- Finding a rule and extending the table, given a table of number pairs
- Identifying and extending repeating shapes and number patterns
- Identifying and extending whole number patterns involving addition and subtraction
- Identifying multiplication facts related to division facts in order to solve division problems
- Interpreting multiplication equations as multiplicative comparisons and represent verbal statements of multiplicative comparisons as multiplication equations
- Multiplying and dividing to solve word problems involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison
- Recognizing multiplication as repeated addition of equal groups used in arrays and comparisons
- Using a rule to extend tables of ordered pairs for situations involving multiplication, addition, or subtraction
- Using and drawing models to solve division problems
- Using multiplication facts with 0 and 1 to learn about special division rules with 0 and 1
- Using multiplication properties to simplify computations
- Using patterns to find products with factors of 2,5, and 9
- Using the Distributive Property to find products of the factors 3,4,6,7, and 8 by breaking apart problems into simpler problems

Assessments

- Basic Facts Timed Tests
- Benchmark Tests
- End of Year Test (administered after completing program)
- Placement Test (administered prior to beginning 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)

- Toss and Talk (1-1) - Toss two number cubes. Add the dots. Find your toss on the game sheet and follow the directions.
- Teamwork (1-2)- Pick a tile and follow the directions on the game sheet.
- Teamwork (1-3)- Choose a letter and follow the directions on the game sheet.
- Toss and Talk (1-4)- Toss two number cubes. Add the dots. Find your toss on the game sheet and follow the directions.
- Toss and Talk (1-5)- Toss two number cubes. Add the dots. Find your toss on the game sheet and follow the directions.
- Think Together (1-6)- Pick a tile and read the directions next to your number. Divide with squares.
- Teamwork (1-7)
- Clip and Cover (1-8)- Pick two numbers and cover answer with paper clip. The person to cover three in a row wins.
- Quick Questions (1-9)- Listen to questions and answer mentally.
- Teamwork (2-1)
- Toss and Talk (2-2)
- Display the Digits (2-3)
- Toss and Talk (2-4)
- Teamwork (2-5)
- Toss and Talk (2-6)

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

Interactive Learning - Problem-Based Interactive learning activities at the beginning of each topic

Projects - There is a math project for each topic (See Cross-Disciplinary Instruction for projects and page numbers)

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

- Play SCOOT for certain sections or review for topic tests

- Task cards and use answer sheets for assessment

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:**
    - Allow students who are performing below level to model multiplication sentences with counters.
    - Have students make flash cards for multiplication facts they find especially difficult. Below each fact, have them draw an array for that fact. Also have them write different ways to find the fact. For example, to find 6x9, you can double the product 3x9
  - **Students with special needs:**
    - Students with special needs benefit from many opportunities to model problems with manipulatives. Whenever possible, allow students to use the actual objects mentioned in the problem.
    - Emphasize the relationship between multiplication and repeated addition. Connecting newer skills to known skills will help students assimilate the new concepts.
    - Frequent repetition of the terms factor and product will help students become fluent with these words.
    - Review with students how division can be thought of as equal groups or as repeated subtraction. Point out that both models use the same idea. During repeated subtraction, each time a number is subtracted, one equal group is taken away.

- **ELL**
  - Relating multiplication stories to arrays and number sentences helps students understand multiplication. Always stress the words factor and product when multiplying so students gain fluency with these terms. Having students understand the concepts of multiplication and division as inverse operations will help them to find the number sentences in the fact families.
  - **Emerging:** Have students skip count aloud while pointing to numbers on a hundred chart. Have them describe patterns using words such as factors, products, multiple, odd, and even. Discuss the concept of inverse operations by relating it to everyday life, such as the act of putting on a sweater and then taking it off. Relate the first action to multiplication and the second action to division.
  - **Expanding:** Write several basic facts on the board. State the factors and products for each by saying: In this multiplication problem, __and__ are the factors and ___ is the product. Then have students describe arrays in terms of the rows and columns.

- **Advanced/Gifted:**
  - Encourage advanced students to look for further patterns in multiplication facts. For example, have students compare products for the 3s, 6s, and 12s to see how they relate.
  - If students excel at using the Distributive Property to break apart arrays, challenge them to use this method to multiply numbers like 15x3 and 22x6.

- **Topic 2**
  - **Below level students:**
    - Students experiencing difficulty in identifying pattern relationships will benefit from opportunities designed to reinforce understanding of how patterns repeat themselves.
      - Use dot cards to emphasize number pattern relationships. Show students a series of five cards with 5 dots on each card. Have them skip count by fives. Then ask them to name the number pattern and write it on the board. After students examine the pattern, have them predict the next two numbers. Repeat the activity with dot cards for 2s, 3s, and 4s.
  - **Students with special needs:**
    - Using tactile objects will help students with visual impairments grasp the concept of skip counting and geometric patterns.
      - Use tactile objects such as pattern blocks, crayons, buttons, erasers, or other classroom objects, and arrange them in ABAB, AABAAB, or other repeated patterns. Have the student pick the object that comes next.

  - **ELL**
    - Repeated oral language practice with patterns will help English learners to understand number relationships.
    - **Emerging:** Teach children to chant number patterns such as counting by 2s and 5s. Have groups of students hold up fingers as they chant.
    - **Expanding:** Use counters to model skip counting by 2s, 3s, 5s, and 10s. As you model the pattern ask students to identify the pattern,such as counting by threes. Then model the next number in the pattern.
    - **Bridging:** Use pattern blocks to begin a more complex pattern such as 1 triangle, 2 squares. Show the first four elements of the pattern: 1 triangle, 2 squares, 1 triangle. What comes next? How do you know?

  - **Advanced/Gifted:**
    - Students who quickly recognize patterns and relationships can be challenged with this activity:

- Write a series of numbers on four index cards, such as 14, 20, 24, and 28. Have students mix up the cards and place them faceup on a table. Tell students to use the rule "subtract 3." What is the new pattern? (11, 17, 21, 25)
- Repeat using other series of numbers and patterns.

Integrated/Cross-Disciplinary Instruction

Reading and Writing: The Math Concept Readers allow the student to read the story at different levels- above level, on level, and below level. Complete the Think and Respond and Write Math questions at the conclusion of each book.

Topic 1: Social Studies: Auto Club Speedway- making a multiplication booklet to write a word problem and draw an array - pg 3

Topic 2: Science: Ostriches - finding the rate of growth for an ostrich - pg 37E

Resources

Topics Categories in book form:

Topic 1: Multiplication and Division: Meanings and Facts

Topic 2: Generate and Analyze Patterns

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.