

Grade 2 Mathematics, Quarter 4, Unit 4.1
Setting the Foundation for Multiplication

Overview

Number of Instructional Days: 15 (1 day = 45-60 minutes)

| Content to Be Learned | Mathematical Practices to Be Integrated |
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| <ul style="list-style-type: none"> • Determine whether a group of objects has an odd or even number of objects. • Write equations to represent even numbers as a sum of equal addends. • Create rectangular arrays with up to 5 rows and 5 columns. • Write a repeated addition equation to represent the number of objects in a rectangular array. • Partition rectangular arrays into rows and columns of same-sized squares. | <p>2. Reason abstractly and quantitatively.</p> <ul style="list-style-type: none"> • Write equations to represent even numbers as a sum of equal addends. • Write repeated addition equations to represent the number of objects in rectangular arrays. <p>7. Look for and make use of structure.</p> <ul style="list-style-type: none"> • Examine how even and odd numbers are put together. • Understand arrays are composed of rows and columns with equal number of objects. • Partition rectangles into rows and columns. <p>8. Look for and express regularity in repeated reasoning.</p> <ul style="list-style-type: none"> • Recognize a pattern in the structure of odd and even numbers. • Connect addition equations to rectangular arrays. • Develop strategies for dividing a rectangle into 2, 3, 4 and 5 rows and columns. |

| Essential Questions | |
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| <ul style="list-style-type: none"> • How could you prove that a group of objects has an even or odd number? • What is an array? • How can rectangular arrays help us with repeated addition? • What does partition mean? What word do you notice in the term partition? | <ul style="list-style-type: none"> • How can you use equations to represent even numbers? • How can you use equations to represent odd numbers? • How would you write an addition equation to represent the number of objects in an array? • What are the steps used to partition a rectangle? |

Written Curriculum

Common Core State Standards for Mathematical Content

Operations & Algebraic Thinking

2.OA

Work with equal groups of objects to gain foundations for multiplication.

3. Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.
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.

Geometry

2.G

Reason with shapes and their attributes.

2. Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

Common Core Standards for Mathematical Practice

2. Reason abstractly and quantitatively.

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

7. Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y .

8. Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Clarifying the Standards

Prior Learning

In grade 1, students continue to develop their understanding of representing addition problems with equations. This understanding will help them connect repeated addition equations to rectangular arrays. Student will also learn how to partition a circle and rectangle into two and four equal shares. This initial exposure to partitioning will help prepare students to partition a rectangle into rows and columns of equal sized squares.

Geometry

1.G

3. Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves*, *fourths*, and *quarters*, and use the phrases *half of*, *fourth of*, and *quarter of*. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.

Current Learning

In grade 2, students are setting the foundation for an understanding of multiplication. Students will become familiar with representing arrays as repeated addition problems. Students will also be introduced informally to the concept of area by counting equal sized squares from a partitioned rectangle. By learning how to classify odd and even numbers students are gaining an initial exposure to division and remainders (odd number). Students also develop a strategy for doubles and doubles +/-1 facts when investigating odd and evens.

Future Learning

Grade 3 Critical Area:

Students recognize area as an attribute of two-dimensional regions. They measure the area of a shape by finding the total number of same-size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication to determine the area of a rectangle.

Additional Findings

Valuable information can be gained from accessing the following resources:

CCSS Progression Documents:

<http://ime.math.arizona.edu/progressions/>

Arizona's College and Career Ready Standard (provides examples of each standard):

<http://www.azed.gov/azccrs/mathstandards/k-2/>

PARCC Model Content Frameworks (K-2):

<http://parconline.org/parcc-model-content-frameworks>