Topic D
The Meaning of Even and Odd Numbers

2.OA.3

Focus Standard:	2.OA.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.
Instructional Days:	4	
Coherence -Links from:	G2–M5	Addition and Subtraction Within 1,000 with Word Problems to 100
-Links to:	G3–M4	Multiplication and Area

In Topic D, students explore the meaning of even and odd numbers, learning various interpretations and relating these interpretations to addition. Lesson 17 introduces even numbers via doubles. In other words, when any number from 1 to 10 is doubled, the resulting number is even, and any even number can be written as a doubles fact. Students arrange doubles into rectangular arrays (e.g., 2 rows of 7, or 2 sevens) and write an equation to show the total as a sum of two equal addends (e.g., 7 + 7 = 14). They discover that doubles facts yield even numbers even when the number being doubled is not even.

In Lesson 18, students pair up to 20 objects and see that, when objects are paired with none remaining, the number is even (**2.OA.3**). They see that objects arranged in columns of two also create two equal groups. For example, a 2 by 7 array may be seen as 7 columns of 2 or 2 rows of 7. Students also see that even numbers occur when we count by twos (e.g., 1 two, 2 twos, …, 7 twos, or 2, 4, 6, …, 14). They count by twos up to 20 and then back down. When they reach zero, the question is posed: "Does this mean zero is even? Can I write 0 as a doubles fact?" As a result, students see that 0 is even. This practice lays the groundwork for the multiplication table of two in Grade 3.

By Lesson 19, students have a keen understanding of how to determine whether or not a number is even. Now, they learn a faster way to identify even numbers by looking for 0, 2, 4, 6, or 8 in the ones place. First, students use square tiles to build an array made up of columns of 2 and relate it to even numbers on a number path up to 20. As multiples of two are circled on the number path, students observe that the ones digits are 0, 2, 4, 6, and 8. Now, equipped with this interpretation, as well as the previously learned interpretations of even numbers, students are ready to name all other whole numbers as odd. They learn that odd numbers can be identified in contrast to even (i.e., if a number is not even, then it is odd).

Next, they learn that when one is added to or subtracted from any even number, the resulting number is odd. Finally, students apply all of the interpretations they have learned to discern whether or not numbers larger than 20 are even. For example, a student might reason that 41 is odd because it is an even number plus one or because it does not end in 0, 2, 4, 6, or 8.

Topic D culminates with students using arrays to investigate even and odd numbers. Students build arrays, as they did in Lesson 17, using even numbers, and they see concretely that when a number is even, it can be decomposed into two equal parts or groups of two. They then either remove or add on 1 square unit to make an odd number. This enables students to solidify the understanding that an odd number is either one more or one less than an even number and that it cannot be decomposed into two equal groups or groups of two, although it may be decomposed into more than two groups (e.g., a 3 by 3 array). Students add even numbers to other even numbers, odd numbers to other odd numbers, and even numbers to odd numbers to see what happens to the sum in each case. They discover that the sum of two even numbers is even, and the sum of two odd numbers is even. They also discover that the sum of an odd number and an even number is odd. Through these explorations, students build an intuitive understanding of prime, composite, and square numbers, which is foundational for later grade levels.

A Teaching Sequence Toward Mastery of The Meaning of Even and Odd Numbers
Objective 1: Relate doubles to even numbers, and write number sentences to express the sums. (Lesson 17)
Objective 2: Pair objects and skip-count to relate to even numbers. (Lesson 18)
Objective 3: Investigate the pattern of even numbers: 0, 2, 4, 6, and 8 in the ones place, and relate to odd numbers. (Lesson 19)
Objective 4: Use rectangular arrays to investigate odd and even numbers. (Lesson 20)