



2.OA Red and Blue Tiles

<http://illustrativemathematics.org/standards/k8>

Alignment 1: 2.OA.3

Grade 2

Domain OA: Operations and Algebraic Thinking

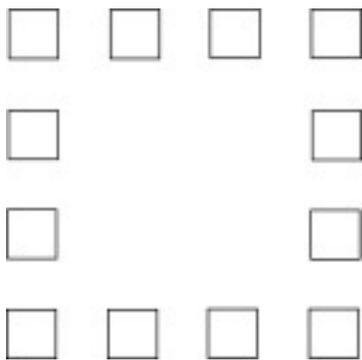
Cluster Work with equal groups of objects to gain foundations for multiplication.

Standard 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.

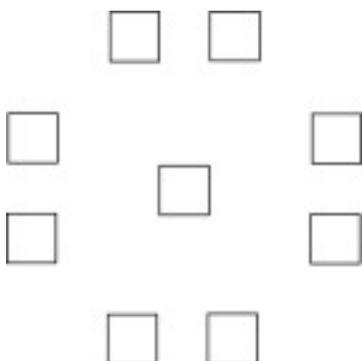
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Lin wants to put some red and blue tiles on a wall for decoration. She is thinking about several different patterns of tiles she could create. She wants to choose a pattern that would let her use exactly as many red tiles as blue tiles.

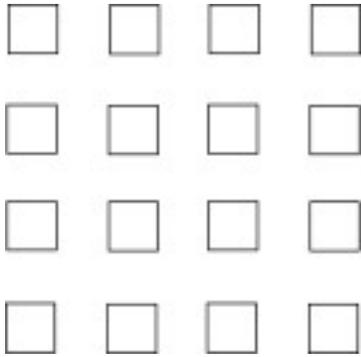
a. Is it possible to create the pattern below using the same number of red tiles as blue tiles? Explain.



b. Is it possible to create the pattern below using the same number of red tiles as blue tiles? Explain.



- c. Can you figure out how many tiles are in the pattern below without counting them one by one? Is it possible to create this pattern using the same number of red tiles as blue tiles? Explain.



- d. Of the patterns above, which ones have an even number of tiles? Which ones have an odd number of tiles? If Lin wants to use an equal number of red tiles and blue tiles, should she use a pattern with an even number of tiles, or one with an odd number of tiles? Explain.

Commentary:

An even number is a whole number that is evenly divisible by 2. There are two interpretations of division: "unknown number of groups" and the "the unknown group size." Standard 2.OA.3 calls for students to determine whether a set of objects contains an even or odd number of members using strategies such as pairing objects or attempting to divide the objects into two equal subgroups; these two strategies correspond to the two interpretations of division that students will study in more depth in third grade.

This task provides opportunities for students to use different strategies to determine whether a set has an even or odd number of objects. In particular, part (b) invites students to pair tiles until it is clear that one unpaired tile is left over; in part (c) the tiling arrangement could easily be divided into two equal parts (e.g., the top half and the bottom half). It would be a good idea for the teacher to draw attention to these two different strategies when they are used by the students.

In addition, part (c) asks students to determine the number of tiles in an array without counting each tile individually. This can be accomplished using repeated addition, as suggested by 2.OA.4. This foreshadows the introduction of multiplication in third grade.

The reading level for this task may be above that of many second graders, so it is likely that the teacher will need to verbally introduce the task to the students. The figures are intentionally drawn so that students can color the tiles, so it would be good to have red and blue crayons or pencils on hand.

Solution: Solution

- The first arrangement can be divided into two equal parts; for example, we can divide the pattern into the top half and the bottom half. This means that the number of tiles in this arrangement is even.
- If we try pairing tiles in the second seating arrangement, we end up with one tile left over. Therefore, the number of tiles in this arrangement is odd.
- The tiles in this arrangement are in a 4-by-4 array, so the total number of tiles is $4 + 4 + 4 + 4 = 16$. Again, we can divide this arrangement into a top half and a bottom half, so the number of tiles is even.
- When the number of tiles is even, Leslie can divide the tiles into two equal-sized groups, one to be made of red tiles and one to be made of blue tiles. She can then create the pattern using an equal number of tiles of each color. When the number of tiles is odd, there will have to be a color (red or blue) that has at least one more tile than the other color. Therefore, Leslie should use a pattern with an even number of tiles if she wants to use the same number of red and blue tiles.