**Splitting Up Arrays: Part One**

*Adapted from North Carolina Department of Public Instruction*

**Student Objective:** “I can find the area of a rectangle by splitting it into smaller rectangles.”

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| **Common Core Standards to Measure** | **Mathematical Practices Addressed** |
| **3.MD.7** Relate area to the operations of multiplication and addition  **a.** Find the area of a rectangle with whole-number side lengths by tiling it, and how that the area is the same as would be found by multiplying the side lengths. | #4 Model with mathematics.  #6 Attend to precision.  #7 Look for and make use of structure.  #8 Look for and express regularity in  repeated reasoning. |

**Materials:**

“Splitting Up Arrays” sheet

12-24 Inch Color Tiles (1 set per pair)

Rulers

Interactive Notebooks

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| G  **Engage Students with the Goal** | State and Rate  Objective: “I can find the area of a rectangle by splitting it into smaller rectangles.” Students rate themselves to the goal (1, 2, 3, 4). | Setting Objectives and Providing Feedback |
| A  **Access Prior**  **Knowledge** | Ask students: *What is another name for breaking apart numbers? (decomposing) What do you do when you decompose a number in an equation?*  Have them write their own definition for decomposing in their Interactive Notebooks and share with a partner. | Cues, Questions, and Advance Organizers  Cooperative Learning  Summarizing and Note-Taking |
| N  **New Information** | Tell students: *We use decomposing numbers as a strategy when multiplying larger numbers. We do this by breaking larger numbers into smaller ones. For example, if I wanted to multiply 8 x 7, how could I break apart the 8 to make a simpler problem?* List their responses on the board.  (Expected student responses may include: 7 + 1, 6 + 2, 5 + 3, etc. Notation should be consistent with the way the numbers were originally arranged in the problem, ex. (7 + 1) x 7  Ask them: *Could I use the same strategy to multiply 9 x 7?* How? Have students write how they decomposed and solved in their Interactive Notebooks. Then, have students share their thinking with a partner and share out to the class. As students share, list all possible ways on the board and have them record what is discussed in their Interactive Notebooks.  Suggested questions to ask:  -Will all of these expressions result in the same answer?  -How do we know?  Tell students: *Today, you will use what you know about decomposing numbers to help you split apart arrays to determine area.* | Nonlinguistic Representations  Cooperative Learning  Generating and Testing Hypotheses  Cues, Questions, and Advance Organizers  Summarizing and Note-Taking |
| A  **Application** | *This part of the lesson takes students through the steps they will need to follow for the activity. Encourage students to separate arrays in different ways. In the activity, Students A and B will alternate building arrays and separating them with the ruler.*  Pair students and decide who is Student A and Student B. Pass out color tiles and rulers. Introduce the activity by providing an example:   * Have student A use the tiles to build a 6 X 5 array. * Have student B use the ruler to make one vertical or horizontal separation in the array, creating two smaller arrays. * Both students determine and record the dimensions of each smaller array. * Have students add up the products to determine if the final product matches the original array. * Have students repeat this four times in pairs and record their findings in their interactive notebooks.   *In this discussion, the distributive property is made concrete through the use of the tiles*. Have several pairs share their findings. Discuss:  -What are the dimensions of the arrays you found?  -Will all of these arrays result in the same sum? How can we be sure?  Have students continue to work in pairs on the “Splitting Apart Arrays” task. This activity provides further practice in decomposing arrays to determine area. Continue using the roles as they are stated above.  When students have finished, regroup students by the number they chose. Group students by the same number. In those groups, students should discuss their findings and make additions to their work. Walk around and monitor students’ conversations, questioning as needed. | Summarizing and Note-Taking  Cooperative Learning  Generating and Testing Hypotheses  Nonlinguistic Representations  Providing Feedback |
| G  **Revisit the Goal** | Have students write a statement of learning in their interactive notebooks/journals using words and pictures. Have students share their entry with other students.  State and Rate  Objective: “I can find the area of a rectangle by splitting it into smaller rectangles.” Students rate themselves to the goal (1, 2, 3, 4). | Setting Objectives and Providing Feedback  Summarizing and Note-Taking |

**Evaluation:**

**Formative**- As students work, observe and record students’ strategy use.

**Summative**- Collect the activity sheet to score.

**Differentiation:**

**Intervention-** Student may need to complete the “Splitting Apart Arrays” activity in a small group with a teacher.

**Extension-** Students may choose another number from the sheet to complete the activity.

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Splitting Apart Arrays**

Chose the number of tiles you will use for this activity and circle the number:

12 14 16 18 20 21 22 24

Count out the number of tiles you need. You will only use these tiles.

Complete the chart by writing the equation and answer for each smaller array:

|  |  |  |
| --- | --- | --- |
|  | Array 1 | Array 2 |
| Split Apart 1 |  |  |
| Split Apart 2 |  |  |
| Split Apart 3 |  |  |
| Split Apart 4 |  |  |
| Split Apart 5 |  |  |
| Split Apart 6 |  |  |
| Split Apart 7 |  |  |
| Split Apart 8 |  |  |
| Split Apart 9 |  |  |
| Split Apart 10 |  |  |
| Split Apart 11 |  |  |
| Split Apart 12 |  |  |

Show how to separate the following array into two smaller arrays.

Label and find the area of each array that you create.

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| --- | --- | --- | --- | --- | --- | --- | --- |
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|  |  |  |  |  |  |  |  |

Area \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Show your thinking:

If you have extra time, pick another number of tiles and work on breaking array apart in different ways.