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| **NC.4.OA.4**  **Arranging Chairs** | |
| **Domain** | Operations and Algebraic Thinking |
| **Cluster** | Gain familiarity with factors and multiples. |
| **Standard(s)** | **NC.4.OA.4** Find all factor pairs for whole numbers up to and including 50 to:   * Recognize that a whole number is a multiple of each of its factors. * Determine whether a given whole number is a multiple of a given one-digit number. * Determine if the number is prime or composite. |
| **Materials** | activity sheet, pencil, square tiles (optional) |
| **Task** | **Arranging Chairs**  **Part 1:**  There are 24 chairs in the art room. What are the different ways that the chairs can be arranged into equal groups if you want at least 2 groups and want at least 2 chairs in each group? How do you know that you have found every arrangement? Write equations to show your answers.  *Possible Solutions:*  2 groups of 12; 3 groups of 8; 4 groups of 6; 6 groups of 4; 8 groups of 3; 12 groups of 2  (Example equations: 2 x 12 = 24, 24 ÷ 2 = 12)  **Part 2:**  There are 48 chairs in the multi-purpose room. What are the different ways that the chairs can be arranged into equal groups if you want at least 2 groups and want at least 2 chairs in each group? How do you know that you have found every arrangement? Write equations to show your answers.  *Possible Solutions:*  2 groups of 24; 3 groups of 16; 4 groups of 12; 6 groups of 8; 8 groups of 6; 12 groups of 4; 16 groups of 3; 24 groups of 2  (Example equations: 2 x 24 = 48, 48 ÷ 2 = 24)  **Part 3:**  What relationship do you notice about the size of the groups if the chairs were arranged in 4 groups in both Part 1 and Part 2? What about if the chairs were arranged in 8 groups? Explain why you think this relationship exists.  *Possible Solutions:*  24 chairs can be put into 4 groups of 6. 48 chairs can be put into 4 groups of 12. 24 chairs can be put into 8 groups of 3. 48 chairs can be put into 8 groups of 6. The explanation should reference that 48 is double 24, which means that when one factor remains constant, the other factor is doubled. |

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| **Rubric** | | |
| **Level I**  **Not Yet** | 1. **Level II** 2. **Progressing** | **Level III**  **Meets Expectation** |
| Student has minimal to no solutions to each part of the task AND is unable to explain reasoning. | Student has some possible solutions to each part of the task and is able to explain reasoning. | Student has all possible solutions to each part of the task and is able to clearly explain reasoning. |

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| **Standards for Mathematical Practice** |
| **1. Makes sense and perseveres in solving problems.** |
| **2. Reasons abstractly and quantitatively.** |
| 3. Constructs viable arguments and critiques the reasoning of others. |
| **4. Models with mathematics.** |
| 5. Uses appropriate tools strategically. |
| **6. Attends to precision.** |
| 7. Looks for and makes use of structure. |
| 8. Looks for and expresses regularity in repeated reasoning |

**Arranging Chairs**

**Part 1:**

There are 24 chairs in the art room. What are the different ways that the chairs can be arranged into equal groups if you want at least 2 groups and want at least 2 chairs in each group? How do you know that you have found every arrangement? Write equations to show your answers.

**Part 2:**

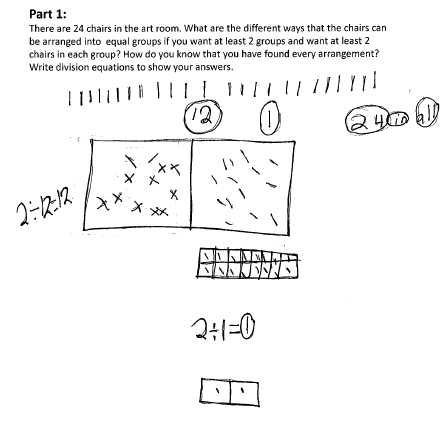
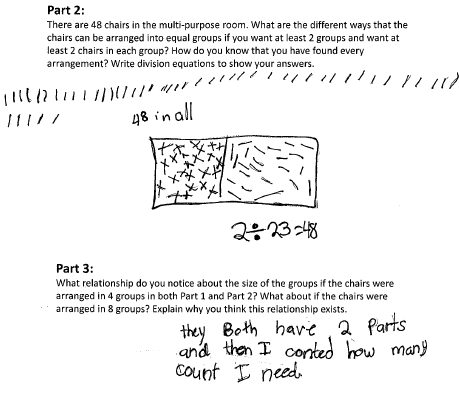
There are 48 chairs in the multi-purpose room. What are the different ways that the chairs can be arranged into equal groups if you want at least 2 groups and want at least 2 chairs in each group? How do you know that you have found every arrangement? Write equations to show your answers.

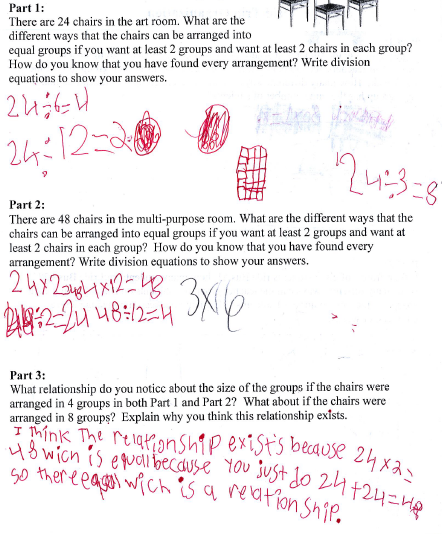
**Part 3:**

What relationship do you notice about the size of the groups if the chairs were arranged in 4 groups in both Part 1 and Part 2? What about if the chairs were arranged in 8 groups? Explain why you think this relationship exists.

**Scoring Examples**

**Not Yet:** The student was unable to generate a correct solution for either problem and was unable to explain his/her reasoning.

**Progressing:** The student has several possible solutions to each part of the task and is able to partially explain his/her reasoning.

**Meets Expectation:** The student has all possible solutions to each part of the task and is able to clearly explain his/her reasoning.

