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| **Area & Perimeter Exploration**  **4.MD.3-Task 1** | |
| **Domain** | **Measurement and Data** |
| **Cluster** | **Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.** |
| **Standard(s)** | **4.MD.3** Apply the area and perimeter formulas for rectangles in real world and mathematical problems. |
| **Materials** | Paper and pencil, graph paper or square tiles |
| **Task** | Examining the relationship between area and perimeter and using area and perimeter formulas for quick calculation.  ***Activity 1***:  Create all the possible arrays with an area of 36 square units.  Draw them on grid paper and label their dimensions.  How can you be sure that you found all the possible arrays with an area of 36 square units?  Find the perimeter for each figure.  What do you notice about the shapes and their perimeters?  What is the relationship between the perimeter and the shape of an array?  ***Activity 2:***  Create all the possible arrays with a perimeter of 36 units.  Draw your arrays on grid paper and label their dimensions.  Use a chart to keep track of the area and dimensions for each rectangle.  How can you be sure that you found all the possible arrays with a perimeter of 36 units? What do you notice about the shapes and their perimeters?  What is the relationship between the area and the shape of an array?  ***Activity 3:***  What generalizations can be made about the relationship between the area and perimeter of a figure?  How could this this information be used to solve a problem in real life? When might it be useful to have this information?  **Possible Solution:**  ***Activity 1:*** All have area of 36 square units.  Perimeter dimensions  74 units 1 x 36  40 units 2 x 18  30 units 3 x 12  26 units 4 x 9  24 units 6 x 6  Possible conclusions: The closer a shape gets to being a square, the smaller its perimeter.  ***Activity 2:*** All have a perimeter of 36 units.  Area dimensions  17 1 x 17  32 2 x 16  45 3 x 15  56 4 x 14  65 5 x 13  72 6 x 12  77 7 x 11  80 8 x 10  81 9 x 9  Possible response: The closer a shape gets to being a square, the larger its area.  Squares have the largest possible area and the smallest possible perimeter. |

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| **Rubric** | | |
| **Level I** | 1. **Level II** | **Level III** |
| Limited Performance   * The student is unable to find all the possible figures with an area of 36 and/or calculate the perimeter for each figure. The student is unable to find all the possible arrays with a perimeter of 36 and/or their areas. The student does not have an efficient strategy to check to make sure that s/he has found all the possible arrays that fit the requirements. They are unable apply the formula for area or perimeter to perform the required calculations. | Not Yet Proficient   * The student is able to find all the possible arrays, areas, and perimeters for Activity 1 and Activity 2. They are unable to make generalizations about the relationship between area and perimeters of squares and rectangles. They are unable to generate an example of how this relationship might be useful in solving a real world problem. | Proficient in Performance   * The student is able to find all the possible arrays, areas, and perimeters for Activity 1 and Activity 2. They are able to make generalizations about the relationship between area and perimeters of squares and rectangles, and to generate at least one example of how this relationship might be useful in solving a real world problem. |

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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. |

**Area & Perimeter Exploration**

***Activity 1***:

* Create all the possible arrays with an area of 36 square units.
* Draw them on grid paper and label their dimensions.
* How can you be sure that you found all the possible arrays with an area of 36 square units?
* Find the perimeter for each figure.
* What do you notice about the shapes and their perimeters?
* What is the relationship between the perimeter and the shape of an array?

***Activity 2:***

* Create all the possible arrays with a perimeter of 36 units.
* Draw your arrays on grid paper and label their dimensions.
* Use a chart to keep track of the area and dimensions for each rectangle.
* How can you be sure that you found all the possible arrays with a perimeter of 36 units? What do you notice about the shapes and their perimeters?
* What is the relationship between the area and the shape of an array?

***Activity 3:***

* What generalizations can be made about the relationship between the area and perimeter of a figure?
* How could this this information be used to solve a problem in real life? When might it be useful to have this information?