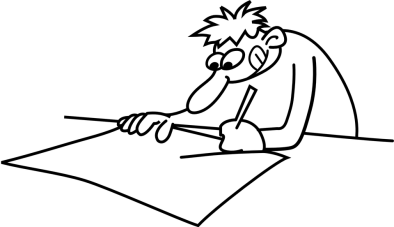
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| **NC.4.MD.3**  **Area & Perimeter Exploration** | |
| **Domain** | Measurement and Data |
| **Cluster** | Solve problems with area and perimeter. |
| **Standard(s)** | **NC.4.MD.3** Solve problems with area and perimeter.   * Find areas of rectilinear figures with known side lengths. * Solve problems involving a fixed area and varying perimeters and a fixed perimeter and varying areas. * Apply the area and perimeter formulas for rectangles in real world and mathematical problems. |
| **Materials** | activity sheet, pencil, graph paper and/or square tiles |
| **Task** | **Area & Perimeter Exploration**  **Part 1:**  Create all the possible arrays with an area of 36 square units. Draw your arrays 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 that you made.   * What do you notice about the shapes and their perimeters? * What is the relationship between the perimeter and the shape of an array?   *Possible Solutions:*  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  **Part 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 areas? * What is the relationship between the area and the shape of an array?   *Possible Solutions:*  Area Dimensions  17 sq units 1 x 17  32 sq units 2 x 16  45 sq units 3 x 15  56 sq units 4 x 14  65 sq units 5 x 13  72 sq units 6 x 12  77 sq units 7 x 11  80 sq units 8 x 10  81 sq units 9 x 9  **Part 3:**  What generalizations can be made about the relationship between the area and perimeter of a figure?  *Possible Conclusions:*   * The closer a shape gets to being a square, the smaller its perimeter. * 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**  **Not Yet** | 1. **Level II** 2. **Progressing** | **Level III**  **Meets Expectation** |
| **Part 1** | Student is able to generate 0-2 arrays with an area of 36 square units and label the perimeter of each. | Student is able to generate 3-4 arrays with an area of 36 square units and label the perimeter of each. | Student is able to generate all arrays with an area of 36 square units and label the perimeter of each. |
| **Part 2** | Student is able to generate 0-4 arrays with a perimeter of 36 units and label the area of each. | Student is able to generate 5-8 arrays with a perimeter of 36 units and label the area of each. | Student is able to generate all arrays with a perimeter of 36 units and label the area of each. |
| **Part 3** | Generalization demonstrates no understanding of the relationship between the area and perimeter of a figure. | Generalization demonstrates incomplete understanding of the relationship between the area and perimeter of a figure. | Generalization demonstrates complete understanding of the relationship between the area and perimeter of a figure. |

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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**

**Part 1**:

Create all the possible arrays with an area of 36 square units. Draw your arrays 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 that you made.

* What do you notice about the shapes and their perimeters?
* What is the relationship between the perimeter and the shape of an array?

**Part 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.

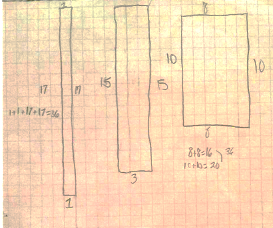
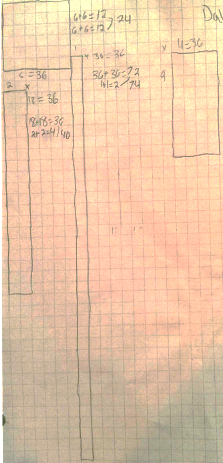
* How can you be sure that you found all the possible arrays with a perimeter of 36 units?
* What do you notice about the shapes and their areas?
* What is the relationship between the area and the shape of an array?

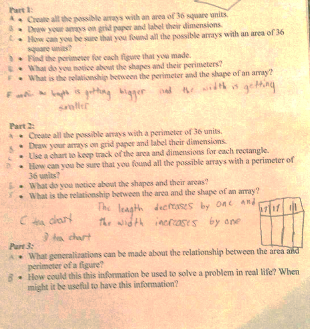
**Part 3:**

* 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?

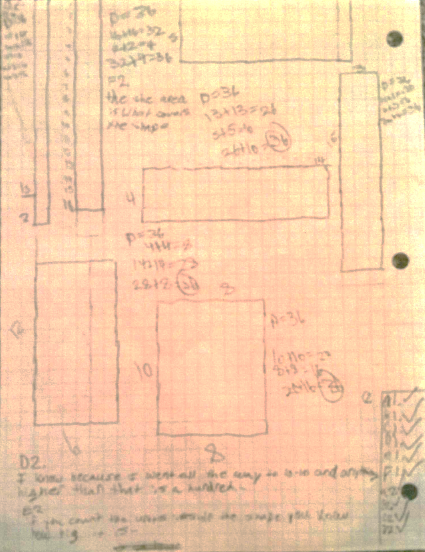
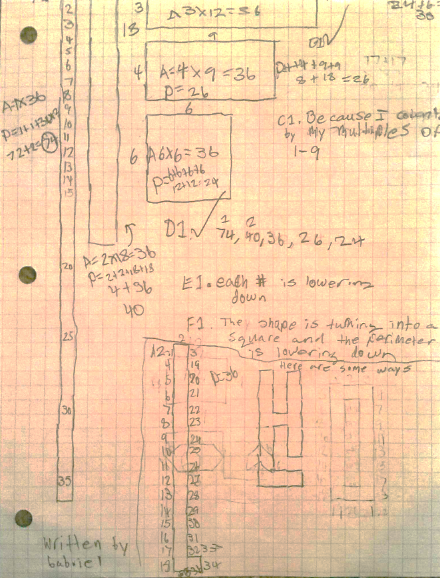
**Scoring Examples**

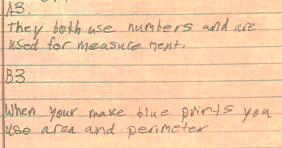
**Not Yet:** The student generates few arrays with an area and/or perimeter of 36. The student does not demonstrate an understanding of the relationship between area and perimeter.





**Progressing:** The student generates several (but not all) areas with an area and/or perimeter of 36. The student does not show a complete understanding of the relationship between area and perimeter.





**Meets Expectation:** The student generates all arrays with an area and/or perimeter of 36. The student’s work demonstrates a complete understanding of the relationship between area and perimeter.

