Visualizing Square Roots (Learning Task)

Name_____ **Date**_____

Adapted from http://www.mathedpage.org/geometry-labs/gl/gl-9.pdf

Mathematical Goals:

- To build the ideas of square and square root on their geometric interpretation.
- To justify simplification of radicals using geometric representations.

Essential Questions:

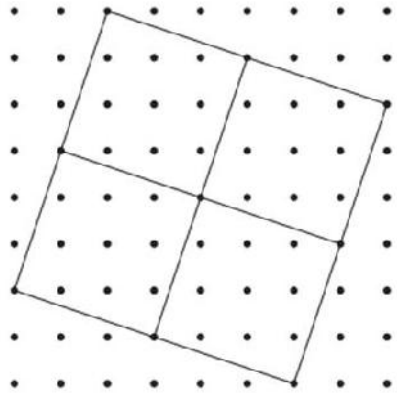
- How do I represent radicals visually?
- What is the relationship between the radicand and the area of a square?
- How do I justify simplification of radicals using geometric representations?

GEORGIA STANDARDS OF EXCELLENCE

MGSE9-12.N.RN.2 Rewrite expressions involving radicals ~~and rational exponents using the properties of exponents.~~ (i.e., simplify and/or use the operations of addition, subtraction, and multiplication, with radicals within expressions limited to square roots).

STANDARDS FOR MATHEMATICAL PRACTICE

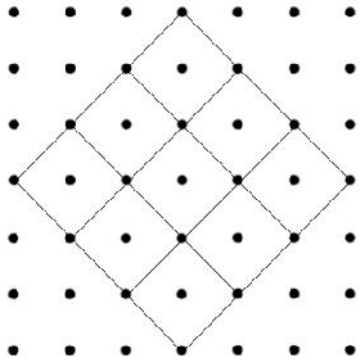
1. Make sense of problems and persevere in solving them
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure



1a. the above figure, what are the following measures?

i. The side of one of the small squares
ii. The area of one of the small squares
iii. The perimeter of one of the small squares
iv. The side of the large square
v. The area of the large square
vi. The perimeter of the large square

1b. Explain, using the answers to Problem 1a, why $\sqrt{40} = 2\sqrt{10}$.



2a. In the above figure, what are the following measures?

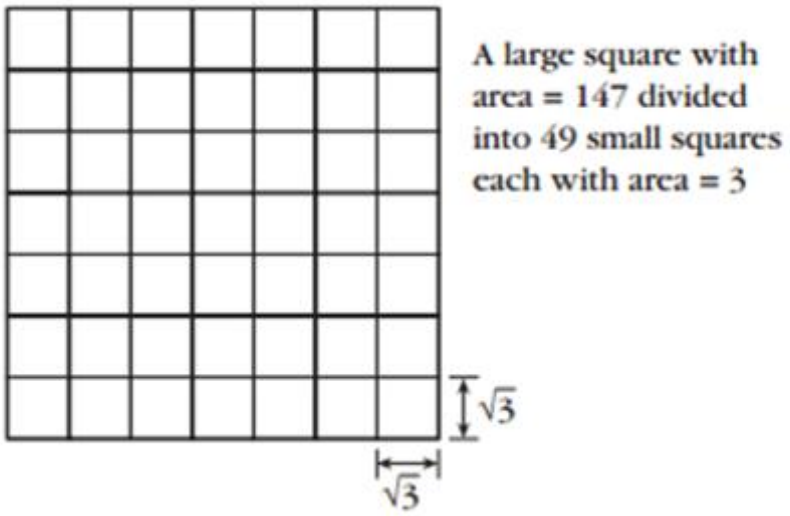
i. The area of one of the small squares
ii. The side of one of the small squares
iii. The area of the large square
iv. The side of the large square

2b. Explain, using the answers to problem 2a, why $\sqrt{18} = 3\sqrt{2}$

3. On dot paper, create a figure to show that $\sqrt{8} = 2\sqrt{2}$, $\sqrt{18} = 3\sqrt{2}, \sqrt{32} = 4\sqrt{2}, and\ \sqrt{50} = 5\sqrt{2}$.

4. On dot paper, create a figure to show that $\sqrt{20} = 2\sqrt{5}$ and $\sqrt{45} = 3\sqrt{5}$.

In the figure on the previous page, and in the figures you made in Problems 3 and 4, a larger square is divided up into *a square number of squares.* This is the basic idea for writing square roots in *simple radical form.* The figure need not be made on dot paper. For example, consider $\sqrt{147}$. Since 147 = 3 ·49, and since 49 is a square number, we can divide a square of area 147 units ^{2} into 49 squares, each of area 3 untis ^{2}:



You will notice that the side of the larger square is $\sqrt{147} = 7\sqrt{3}$

5. Write the following in simple radical form.

i. $\sqrt{12}$
ii. $\sqrt{45}$
iii. $\sqrt{24}$
iv. $\sqrt{32}$
v. $\sqrt{75}$
vi. $\sqrt{98}$