Perfect Squares and Square Roots

Reporting Category Computation and Estimation

Topic Working with perfect squares and square roots

Primary SOL 8.5 The student will
  a) determine whether a given number is a perfect square; and
  b) find the two consecutive whole numbers between which a square root lies.

Related SOL 8.2

Materials
- Squares tiles in different colors (actual or heavy paper)
- Discovering Squares and Squares Roots activity sheet (attached)
- I Have. Who Has? Cards (attached)

Vocabulary
perfect squares, square root (earlier grades)

consecutive (8.5)

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Distribute copies of the Discovering Squares and Squares Roots activity sheet and sets of colored square tiles. Have students work individually to complete the activity sheet.

2. When students are finished, pair them up, and have partners discuss the answers. Next, divide students into small groups to discuss the activity. Then, have a whole class discussion on perfect squares, square roots, and the activity.

3. Give each student an I Have. Who Has? card. Have the student with the starter card come forward and write the problem on the board. The student who has the answer to the problem should come forward and explain the answer, writing the steps used in the solution. Continue this process until all the cards have been used.

Assessment
- **Questions**
  - Why do numbers have both a positive and a negative square root?
  - What is the difference between $\sqrt{169}$ and $-\sqrt{169}$?
  - How many perfect squares lie between 10 and 50? How do you know?
- **Journal/Writing Prompts**
  - Draw a model to represent how you can determine the two consecutive whole numbers between which the $\sqrt{19}$ lies.

Extensions and Connections (for all students)
- After students have determined the square roots of numbers, have them identify whether the numbers are rational or irrational.

Strategies for Differentiation
- Use a number line to show how the square root of a number may lie between two whole numbers.
- Have students shade squares on graph paper instead of using colored square tiles.
- Have students give examples of consecutive numbers before working on square roots to ensure that they understand the vocabulary.
- Have students draw the perfect squares on graph paper.
- Display a multiplication table, and indicate by circling or shading the perfect squares so students will see the diagonal pattern formed.

Discovering Squares and Squares Roots

Name _____ **Date** _____

1. Use colored square tiles to make a square with an area of 16. What is the length of a side of

    your square? _____ Therefore, the square root of 16 equals _____ .

2. Use colored square tiles to make a square with an area as close to 12 as possible but not

    greater than 12. What is the length of a side of the largest square you can make? _____

    Therefore, the square root of 12 is greater than _____ but less than _____ .

3. Make a square with a side length of 5. What is the area of the square? _____ Therefore,

    5^2 = _____, and the square root of 25 = _____.

4. What is the largest square you can make using 40 tiles? _____ What does this tell us about

    the square root of 40? _____

    _____

5. If I want the side length of a square to be between 5 and 6, what is one possible value for the

    area of the square? _____ How do you know? _____

    _____

6. Draw a number line, and plot the square root of 14 and the square root of 8.

I Have. Who Has? Cards

Copy cards on cardstock, and cut out.

Starter Card

Who has 4^2?

I have 16.

Who has my square root?

I have 4.

Who has the two consecutive numbers
between which the $\sqrt{29}$ lies?

I have 5 and 6.

Who has 5^2?

I have 25.

Who has the two consecutive numbers
between which the $\sqrt{45}$ lies?

I have 6 and 7.

Who has the square root of 169?

I have 13.

Who has the square root of 400?

I have 20.

Who has the area of a square with a side length of 7?

I have 49.

Who has the length of a side of square with an area of 81?

I have 9.

Who has the two consecutive numbers between which
the length of a side of a square with an area of 122 lies?

I have 10 and 11.

Who has 12^2?

I have 144.

Who has 10^2?

I have 100.

Who has the two consecutive numbers
between which the square root of 74 lies?

I have 8 and 9.

Who has the area of a square with a side length of 15?

I have 225.

Who has the square root of 289?

I have 17.

Who has the two consecutive numbers
between which the square root of 5 lies?

I have 2 and 3.

Who has the $-\sqrt{36}$?

I have −6.

Who has the two consecutive numbers
between which the $-\sqrt{111}$ lies?

I have −10 and −11.

Who has the $-\sqrt{256}$?

I have −16.

Who has the two consecutive numbers
between which $-\sqrt{300}$ lies?