

Name \_\_\_\_\_

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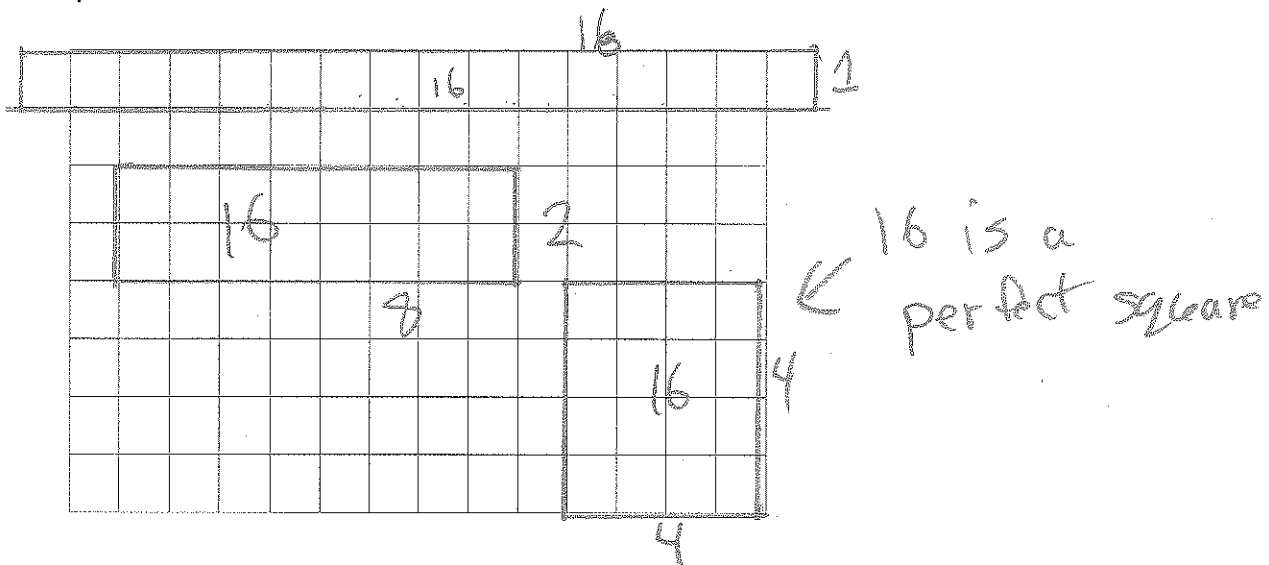
### Study Guide: Squares and Square Roots

Topic 1: Write the definition of a perfect square: The side lengths are whole numbers

Write the pattern of square numbers from  $1^2$  to  $12^2$ .

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144

Use the grid to draw all congruent and non-congruent rectangles to see if 16 is a perfect square.



Topic 2: Write about the factors of perfect squares: Perfect squares have an odd number of factors

List all the factors of the first 10 perfect squares greater than 0.

Perfect Square	Factors
$1=1^2$	1
$4=2^2$	1, 2, 4
$9=3^2$	1, 3, 9
$16=4^2$	1, 2, 4, 8, 16
$25=5^2$	1, 5, 25
$36=6^2$	1, 2, 3, 4, 6, 9, 12, 18, 36
$49=7^2$	1, 7, 9
$64=8^2$	1, 2, 4, 8, 16, 32, 64
$81=9^2$	1, 3, 9, 27, 81
$100=10^2$	1, 2, 4, 5, 10, 20, 25, 50, 100

Topic 3: Write the definition of a square root of a perfect square: It is the side length of a square

Find the square root of each number.

a)  $\sqrt{49}$

7

b)  $\sqrt{64}$

8

c)  $\sqrt{196}$

14

d)  $\sqrt{144}$

12

e)  $\sqrt{81}$

9

Draw the factor rainbow for the number 36. Which factor is the square root? How do you know?



The line starts and ends at 6

Evaluate.

a)  $\sqrt{64} - \sqrt{49}$

$$\begin{array}{r} 8 - 7 \\ 1 \end{array}$$

b)  $\sqrt{144} \div \sqrt{36}$

$$\begin{array}{r} 12 \div 6 \\ 2 \end{array}$$

c)  $\sqrt{25} \times \sqrt{81}$

$$\begin{array}{r} 5 \times 9 \\ 45 \end{array}$$

Topic 4: Find the prime factorization of each perfect square. List the prime numbers.

a) 36

$$\begin{array}{c} 36 \\ / \quad \backslash \\ 6 \quad 6 \\ / \quad \backslash \quad / \quad \backslash \\ 2 \quad 3 \quad 2 \quad 3 \\ 2 \times 2 \times 3 \times 3 \end{array}$$

b) 64

$$\begin{array}{c} 64 \\ / \quad \backslash \\ 8 \quad 8 \\ / \quad \backslash \quad / \quad \backslash \\ 4 \quad 2 \quad 4 \quad 2 \\ / \quad \backslash \quad / \quad \backslash \\ 2 \quad 2 \quad 2 \quad 2 \\ 2 \times 2 \times 2 \times 2 \times 2 \times 2 \end{array}$$

c) 196

$$\begin{array}{c} 196 \\ / \quad \backslash \\ 14 \quad 14 \\ / \quad \backslash \quad / \quad \backslash \\ 2 \quad 7 \quad 2 \quad 7 \\ 2 \times 2 \times 7 \times 7 \end{array}$$

The prime factorization of 14 is  $2 \times 7$ . What is the prime factorization of  $14^2 = 14 \times 14$ ?

$$2 \times 2 \times 7 \times 7$$

Topic 5: Be able to explain why some numbers are not perfect squares, ex. 19. Why is 19 not a perfect square?

The side length is a decimal, not a whole number.

These numbers are square numbers.

Which two perfect squares is each number between?

a) 9 11 16

b) 25 28 36

c) 81 91 100

Estimate each square root to **one decimal place**.

$\sqrt{34} =$

5.9

$\sqrt{90} =$

9.5

$\sqrt{111} =$

10.5

What is the difference between a square number and a square root?

Square number - area of a square  
Square root - side length of a square

Which 2 consecutive whole numbers is  $\sqrt{43}$  between? Who do you know?

$$\begin{array}{ccc} \sqrt{36} & \sqrt{43} & \sqrt{49} \\ 6 & & 7 \end{array}$$

Between 6 and 7. 43 is between 36 and 49

Decide whether 1258 is a perfect square by finding its prime factorization. Justify your answer.

$$\begin{array}{c} 1258 \\ / \quad \backslash \\ 2 \quad 629 \end{array}$$

1258 has no even number of factors  
2 appears once, and 629 appears once.