LESSON 4-5 Challenge

Dig It!

Find the **digital root** of a number by adding its digits, adding the digits of the result, and so on, until the result is a single digit.

358 → 3 + 5 + 8 = 16 → 1 + 6 = 7 The digital root of 358 is 7.

1. Complete the table to find the digital roots of the squares of 1–17.

		Digital Root		
Number	**Square**	**Calculation**		
1	1		=	1
2	4		=	4
3	9		=	9
4	16	1 + 6	=	7
5	25	2 + 5	=	7
6	36	3 + 6 = 9	=	9
7	49	4 + 9 = 13 → 1 + 3	=	4
8	64	6 + 4 = 10 → 1 + 0	=	1
9	81	8 + 1	=	9
10	100	1 + 0 + 0	=	1
11	121	1 + 2 + 1	=	4
12	144	1 + 4 + 4	=	9
13	169	1 + 6 + 9 = 16 → 1 + 6	=	7
14	196	1 + 9 + 6 = 16 → 1 + 6	=	7
15	225	2 + 2 + 5	=	9
16	256	2 + 5 + 6 = 13 → 1 + 3	=	4
17	289	2 + 8 + 9 = 19 → 1 + 9 = 10 → 1 + 0	=	1

2. Make an observation about the results. Possible answers:

The only results are 1, 4, 7, or 9.

3. Make a conjecture about the digital root of any whole-number perfect square. Verify your conjecture by using at least three more perfect squares.

The result is one of the numbers 1, 4, 7, or 9. Choices vary.

4. A **palindrome** is a number that is the same when read forward or backward, such as 14741. Find two palindromes in the table.

The digital roots of the squares of the numbers 1–8 and then 10–17.

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LESSON 4-5 Problem Solving

Squares and Square Roots

Write the correct answer.

1. For college wrestling competitions, the NCAA requires that the wrestling mat be a square with an area of 1764 square feet. What is the length of each side of the wrestling mat?

42 feet

2. For high school wrestling competitions, the wrestling mat must be a square with an area of 1444 square feet. What is the length of each side of the wrestling mat?

38 feet

3. The Japanese art of origami requires folding square pieces of paper. Elena begins with a large sheet of square paper that is 169 square inches. How many squares can she cut out of the paper that are 4 inches on each side?

9 squares

4. When the James family moved into a new house they had a square area rug that was 132 square feet. In their new house, there are three bedrooms. Bedroom one is 11 feet by 11 feet. Bedroom two is 10 feet by 12 feet and bedroom three is 13 feet by 13 feet. In which bedroom will the rug fit?

Bedroom three

Choose the letter for the best answer.

5. A square picture frame measures 36 inches on each side. The actual wood trim is 2 inches wide. The photograph in the frame is surrounded by a bronze mat that measures 5 inches. What is the maximum area of the photograph?

A 841 sq. inches **B** 900 sq. inches
C 1156 sq. inches **D** 484 sq. inches

6. To create a square patchwork quilt wall hanging, square pieces of material are sewn together to form a larger square. Which number of smaller squares can be used to create a square patchwork quilt wall hanging?

F 35 squares **G** 64 squares
H 84 squares **J** 125 squares

7. A can of paint claims that one can will cover 400 square feet. If you painted a square with the can of paint, how long would it be on each side?

A 200 feet **B** 65 feet
C 25 feet **D** 20 feet

8. A box of tile contains 12 tiles. If you tile a square area using whole tiles, how many tiles will you have left from the box?

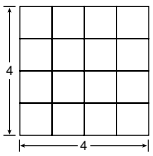
F 9 **G** 6
H 3 **J** 0

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LESSON 4-5 Reading Strategies

Connect Words with Symbols

A **square root** produces a given number when multiplied by itself. The large square shown below is 4 squares long on each side and has 16 squares. 4 times 4 equals 16. 4 is the **square root** of 16.



The 4 × 4 square can be described with symbols and with words.

Symbols	Symbols	Words
4 • 4 = 16	$4^2 = 16$	→ Four squared equals sixteen.

This sign represents square root: $\sqrt{\ }$
$\sqrt{16} = 4$ → Read "The square root of 16 equals 4."
$\sqrt{25} = 5$ → Read "The square root of 25 equals 5."

Compare the symbols for "squared" and "square root."
$4^2 = 16$ and $\sqrt{16} = 4$
$5^2 = 25$ and $\sqrt{25} = 5$

Write in words.

1. 6^2 six squared

2. $\sqrt{36}$ the square root of thirty-six

Answer each question.

3. What is the square root of 36? 6

4. What is the square root of 100? 10

5. What is 7^2? 49

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LESSON 4-5 Puzzles, Twisters & Teasers

Squaresville, Man!

Circle words from the list in the word search. Then find a word that answers the riddle. Circle it and write it on the line.

principal square root perfect negative
positive solution calculator inverse operation

N	M	J	P	R	I	N	C	I	P	A	L	N
E	G	H	J	O	G	B	R	L	E	J	P	O
G	M	N	B	O	S	D	U	S	R	L	O	I
A	L	K	J	T	A	X	M	E	F	O	S	T
T	C	V	B	N	M	J	B	D	E	M	I	A
I	N	V	E	R	S	E	Y	V	C	Z	T	R
V	S	Q	U	A	R	E	L	P	T	C	I	E
E	C	A	L	C	U	L	A	T	O	R	V	P
S	O	L	U	T	I	O	N	U	I	O	E	O

Why did the cookie go to see the doctor?

He was feeling C R U M B Y.



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