Square Roots

The **square** of a number is that number multiplied by itself. For example, six squared = $6^2 = 6 \cdot 6 = 36$. (Recall that the square of 6 tells us the area of a square with sides 6 units long.)

Taking a **square root** is the opposite operation to squaring: the square root of 36 is the number that when squared, gives you 36.

There are actually two such numbers: 6 and −6. The positive one, 6, is **the principal square root** of 36. We use the "$\sqrt{\ }$" symbol (called the "radical sign" or "radix") to signify the principal square root of a number. For example, $\sqrt{25} = 5$ because $5^2 = 25$.

The words "radish" and "radical" both come from the Latin word *radix*, meaning **root**.

Taking a square root allows us to find the side length of a square when its area is given.

Here is a way to remember what a square root is. In the picture on the right, the area of a square is written inside the square and the length of the side is written to the side:

Now, imagine the square is a radical sign that "houses" the number for the area:

$$\sqrt{49} = 7$$

To find the (principal) **square root of a number, think of a square with that area, and find the side length of that square.**

1. Find the (principal) square roots.

a. $\sqrt{100}$	**b.** $\sqrt{64}$	**c.** $\sqrt{4}$	**d.** $\sqrt{0}$
e. $\sqrt{81}$	**f.** $\sqrt{144}$	**g.** $\sqrt{1}$	**h.** $\sqrt{10{,}000}$

2. It is especially easy to find square roots of numbers that are **perfect squares:** numbers we get by squaring whole numbers. For example, 49 is a perfect square because it is 7^2. Fill in the list of perfect squares from 1^2 to 20^2 at the right:

x	x^2
1	1
2	4
3	9
4	_____
_____	_____
_____	_____
_____	49
8	_____
9	_____
_____	_____

x	x^2
11	_____
12	_____
13	_____
14	_____
15	_____
_____	256
_____	289
_____	324
_____	_____
_____	_____

3. Find the square roots of these perfect squares.

a. $\sqrt{169}$ **b.** $\sqrt{900}$

c. $\sqrt{225}$ **d.** $\sqrt{121}$

e. $\sqrt{441}$ **f.** $\sqrt{8{,}100}$

g. $\sqrt{324}$ **h.** $\sqrt{400}$

i. $\sqrt{6{,}400}$ **j.** $\sqrt{25{,}600}$

k. $\sqrt{16{,}900}$ **l.** $\sqrt{1{,}000{,}000}$