



## Square Roots (page 1)

A **square root** of a number is a number that, when multiplied by itself, equals the given number. Every positive number has a positive and a negative square root. The **principal square root** is the *nonnegative* square root of a nonnegative real number. For example, the principal square root of 9 is 3, although *both*  $-3$  and  $3$  are square roots of 9. A **perfect square** is a number with integers as its square roots. The symbol  $\sqrt{\quad}$  is called a radical sign. The number under the radical sign is called the radicand.

Positive/principal square root	$\sqrt{16} = 4$
Negative square root	$-\sqrt{16} = -4$
Both square roots	$\pm\sqrt{16} = \pm 4$

### Examples:

Find the answers:

a)  $\sqrt{36} = 6$

d)  $\sqrt{2.25} = 1.5$

b)  $-\sqrt{\frac{4}{25}} = -\frac{2}{5}$

e)  $-\sqrt{81} = -9$

c)  $\pm\sqrt{1.44} = \pm 1.2$

f)  $\pm\sqrt{\frac{9}{64}} = \pm\frac{3}{8}$

Evaluate the expressions:

a)  $3\sqrt{16} = 3(4)$   
 $= 12$

$\sqrt{\frac{16}{4}} + \frac{1}{2} = \sqrt{4} + \frac{1}{2}$

c)  $= 2 + \frac{1}{2}$   
 $= 2\frac{1}{2}$

b)  $(\sqrt{25})^2 + \sqrt{196} = 25 + 14$   
 $= 39$

Solve for  $x$ .

a)  $x^2 = 81$

$x^2 = 81$

$\sqrt{x^2} = \sqrt{81}$

$x = \pm 9$

(When solving an equation, show both roots.)

b) As square with side length  $x$  has an area of 400 square inches. The equation  $x^2 = 400$  shows the area. What is the side length of the square?

$x^2 = 400$

$\sqrt{x^2} = \sqrt{400}$

$x = 20 \text{ inches}$

(A negative root would not make sense.)

## Square Roots (page 2)

*Find the two square roots of the number:*

1. 36

2. 289

3. 144

*Simplify the expressions:*

4.  $-4\sqrt{64}$

5.  $(\sqrt{121})^2 + \sqrt{81}$

6.  $\frac{3}{4} + \sqrt{\frac{49}{16}}$

7.  $\pm\sqrt{225}$

8.  $-2\sqrt{400} + 121$

9.  $\sqrt{25} - 9$

10.  $-\sqrt{\frac{81}{100}}$

11.  $-\sqrt{36}$

12.  $\sqrt{0.49}$

*Solve:*

13.  $y^2 = 36$

14.  $x^2 = 0.25$

15.  $y^2 = 1$

16.  $r^2 = -25$

17. A kids karate match is held on a square mat that has an area of  $361 \text{ ft}^2$ . What is the length of each side?