

Parent Newsletter

Chapter 10: Square Root Functions and Geometry

Students will...

- Graph square root functions.
- Compare graphs of square root functions.
- Simplify radical expressions.
- Solve square root equations, including those with square roots on both sides.
- Identify extraneous solutions.
- Discover the Pythagorean Theorem.
- Find missing side lengths of right triangles.
- Identify right triangles.
- Find distances between two points.
- Solve real-life problems.

In mathematics, a rule is called a **theorem**.

The **legs** of a right triangle are the two sides that form the right angle.

The **hypotenuse** of a right triangle is the side opposite the right angle.

You can use the **distance formula** to find the distance between any two points in a coordinate plane.

Standards

California Common Core: 8.G.6, 8.G.7, 8.G.8, N.RN.2, F.IF.4, F.IF.7b

Essential Questions

- How can you sketch the graph of a square root function?
- How can you solve an equation that contains square roots?
- How are the lengths of the sides of a right triangle related?
- In what other ways can you use the Pythagorean Theorem?

Key Terms

A **square root function** is a function that contains a square root with the independent variable in the radicand.

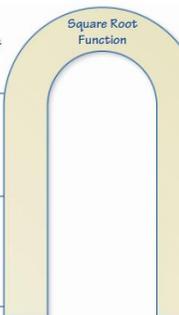
A radical expression is in **simplest form** when:

- no radicands have perfect square factors other than 1
- no radicands contain fractions
- no radicands appear in the denominator of a fraction

When a radicand in the denominator is not a perfect square, multiply the fraction by an appropriate form of 1 to eliminate the radical from the denominator. This process is called **rationalizing the denominator**.

Reference Tools

A Word Magnet can be used to organize information associated with a vocabulary term. Students write the term inside the magnet. Students write the associated information on the blank lines that “radiate” from the magnet.



Square Root Function

Definition: A function that contains a square root with the independent variable in the radicand.

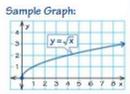
Examples:

$$y = \sqrt{x+3}$$

$$y = \sqrt{x-1}$$

$$y = \sqrt{x+5} - 4$$

Sample Graph:



Domain: The value of the radicand cannot be negative. So, the domain is limited to x-values for which the radicand is greater than or equal to 0.

Graph: Make a table of values. Plot the ordered pairs. Draw a smooth curve through the points. Find the domain and range.

Compare: When graphing a square root function $f(x)$:

- $f(x) + k$ is a vertical translation of $f(x)$.
- $f(x + h)$ is a horizontal translation of $f(x)$.
- $-f(x)$ is a reflection of $f(x)$ in the x-axis.

The binomials $a\sqrt{b} + c\sqrt{d}$ and $a\sqrt{b} - c\sqrt{d}$ are called **conjugates**.

A **square root equation** is an equation that contains a square root with a variable in the radicand.

A solution of a transformed equation that is not a solution of the original equation is an **extraneous solution**.



Key Ideas

Square Root Function

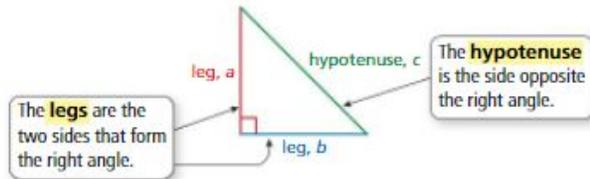
A square root function is a function that contains a square root with the independent variable in the radicand. The most basic square root function is $y = \sqrt{x}$.

Squaring Each Side of an Equation

- If two expressions are equal, then their squares are also equal.
- If $a = b$, then $a^2 = b^2$.

Sides of a Right Triangle

The sides of a right triangle have special names.



The Pythagorean Theorem

- In any right triangle, the sum of the squares of the lengths of the legs is equal to the square of the length of the hypotenuse.
- $a^2 + b^2 = c^2$

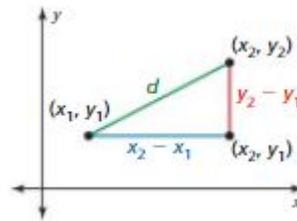
Converse of the Pythagorean Theorem

If the equation $a^2 + b^2 = c^2$ is true for the side lengths of a triangle, then the triangle is a right triangle.

Distance Formula

The distance d between any two points (x_1, y_1) and (x_2, y_2) is given by the formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



Quick Review

- When graphing, remember $f(x) + k$ is a vertical translation of $f(x)$.
- The graph of $f(x - h)$ is a horizontal translation of $f(x)$.
- Rationalizing the denominator works because you multiply the numerator and denominator by the same nonzero number a , which is the same as multiplying by $\frac{a}{a}$, or 1.

- The product of conjugates is a rational number.
- In a right triangle, the legs are the shorter sides and the hypotenuse is always the longest side.
- A *Pythagorean triple* is a set of three positive integers a , b , and c , where $a^2 + b^2 = c^2$.
- When using the converse of the Pythagorean Theorem, always substitute the length of the longest side for c .

What's the Point?

The ability to add, subtract, or multiply polynomials is useful in real-life for finding the perimeter or area of figures such as gardens.

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 7: Bird Dropping Food STEM Video is available online at www.bigideasmath.com.

