

Section Overview

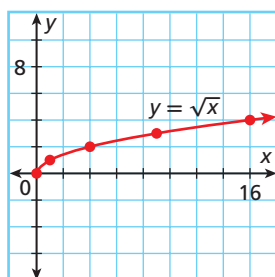
Square-Root Functions

Lesson 11-5

Why? Square-root functions are used in astronomy and geology.

Graph $y = \sqrt{x}$.

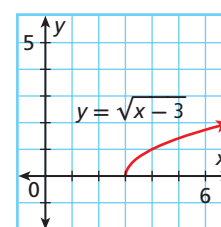
x	y
0	0
1	1
4	2
9	3
16	4



The square root of a negative number is undefined.
The domain of $y = \sqrt{x}$ is $x \geq 0$.

Graph $y = \sqrt{x - 3}$.

Shift the graph of $y = \sqrt{x}$ to the right 3 units.



The domain of $y = \sqrt{x - 3}$ is $x \geq 3$.

Operations with Radical Expressions

Lessons 11-6, 11-7, 11-8

Why? Many formulas in geometry and physics include radical expressions.

$$\begin{aligned} & \sqrt{20} + \sqrt{45} \\ &= \sqrt{4 \cdot 5} + \sqrt{9 \cdot 5} \\ &= \sqrt{4} \sqrt{5} + \sqrt{9} \sqrt{5} \\ &= 2\sqrt{5} + 3\sqrt{5} \\ &= 5\sqrt{5} \end{aligned}$$

$$\begin{aligned} & (3 + \sqrt{7})(5 - \sqrt{7}) \\ &= 15 - 3\sqrt{7} + 5\sqrt{7} - \sqrt{49} \\ &= 15 + 2\sqrt{7} - 7 \\ &= 8 + 2\sqrt{7} \end{aligned}$$

$$\begin{aligned} \sqrt{\frac{5}{6}} &= \frac{\sqrt{5}}{\sqrt{6}} \\ &= \frac{\sqrt{5}}{\sqrt{6}} \left(\frac{\sqrt{6}}{\sqrt{6}} \right) \quad \text{Multiply by 1.} \\ &= \frac{\sqrt{5 \cdot 6}}{\sqrt{6 \cdot 6}} \\ &= \frac{\sqrt{30}}{6} \end{aligned}$$

Radical Equations

Lesson 11-9

Why? Formulas for velocity often include radical equations.

$$\begin{array}{l} \sqrt{x-8} = 4 \\ (\sqrt{x-8})^2 = 4^2 \\ x-8 = 16 \\ \quad +8 \quad +8 \\ \hline x = 24 \end{array} \quad \text{Check} \quad \begin{array}{l} \sqrt{x-8} = 4 \\ \sqrt{24-8} \quad | \quad 4 \\ \sqrt{16} \quad | \quad 4 \\ 4 \quad | \quad 4 \quad \checkmark \end{array}$$

The answer checks. The solution is 24.

$$\begin{array}{l} \sqrt{3x+7} = 4 \\ \quad -7 \quad -7 \\ \hline \sqrt{3x} = -3 \\ (\sqrt{3x})^2 = (-3)^2 \\ 3x = 9 \\ x = 3 \end{array} \quad \text{Check} \quad \begin{array}{l} \sqrt{3x+7} = 4 \\ \sqrt{3(3)+7} \quad | \quad 4 \\ \sqrt{9+7} \quad | \quad 4 \\ 3+7 \quad | \quad 4 \\ 10 \quad | \quad 4 \quad \times \end{array}$$

CAUTION: Squaring both sides of an equation may introduce extraneous solutions.

The answer does not check, so 3 is extraneous. There is no solution.