

Key Concepts: Solving Quadratic Equations using the Square Root Principle
Completing the Square
i yi yi!

The Square Root Principle

For $k \neq 0$, there are two solutions to $u^2 = k$: \sqrt{k} and $-\sqrt{k}$.

The only solution to $u^2 = 0$ is 0.

Examples

Find all solutions to each equation - completely simplify the solutions

$$(2t + 1)^2 = 9$$

$$(6x - 4)^2 = 72$$

$$x^2 - 8x + 16 = 12$$

$$t^2 - 6t + 2 = 0$$

$$y^2 + 20y + 80 = 0$$

Examples

Find the x -intercepts on each parabola.

$$y = 2x^2 - 20x + 8$$

$$y = 3x^2 - 18x + 27$$

***i* Carumba!**

The positive square root of -1 is defined to be the number i .

$$\sqrt{-1} = i \text{ and } -\sqrt{-1} = -i$$

Example

Find all solutions to $g(x) = 0$ where $g(x) = x^2 + 4x + 7$; completely simplify the solutions.

Example

Find all solutions to $(4y - 12)^2 = -18$; completely simplify the solutions.

True or False

$$\sqrt{-4}\sqrt{-9} = \sqrt{(-4)(-9)} ?$$

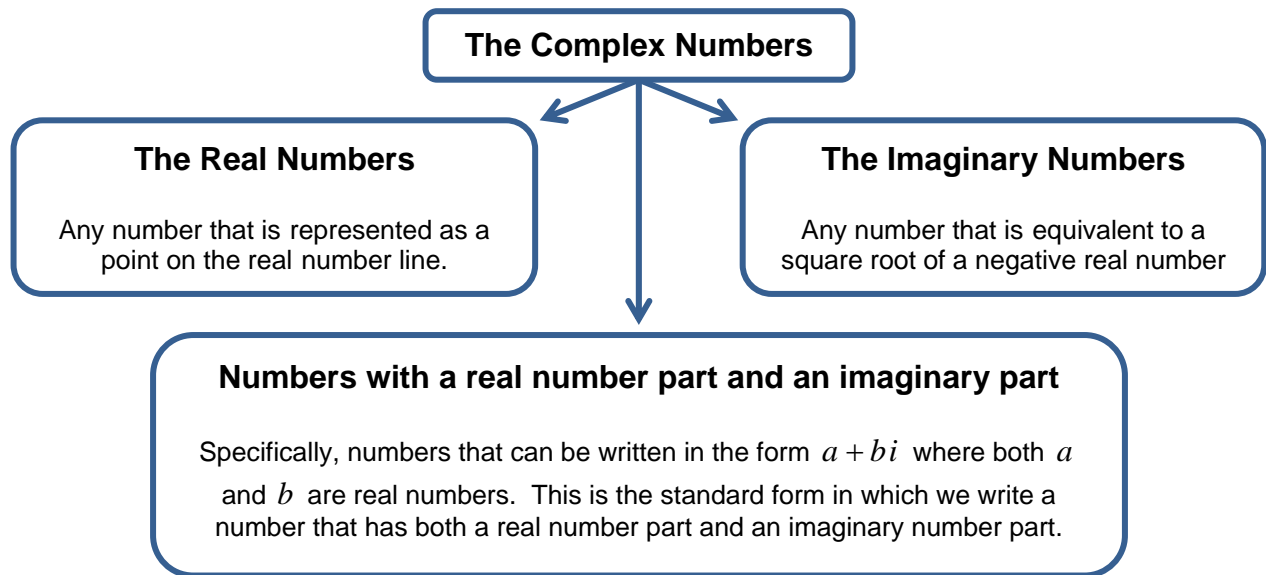
Example

Completely simplify each expression

$$(-3i)(-7i)$$

$$\sqrt{6}\sqrt{-6}$$

$$\sqrt{-10}\sqrt{-5}$$



Example

Perform each operation and write the result in standard complex number form.

$$(2 + 3i) - (7 - 2i)$$

$$(9 - 2i)(3 + 4i)$$

$$(4 + i)^2$$

$$(9 - i)(10 + 3i)$$

$$5 \text{ divided by } 2 - 3i$$

$$3 + 2i \text{ divided by } 3 - 2i$$

$$\frac{72}{2i}$$

$$\frac{5 - 8i}{4i}$$

Example

Complete the following.

$$i^1 =$$

$$i^5 = i^4 \cdot i =$$

$$i^9 =$$

$$i^2 = i^1 \cdot i =$$

$$i^6 = i^5 \cdot i =$$

$$i^{10} =$$

$$i^3 = i^2 \cdot i =$$

$$i^7 = i^6 \cdot i =$$

$$i^{11} =$$

$$i^4 = i^3 \cdot i =$$

$$i^8 = i^7 \cdot i =$$

$$i^{12} =$$

Find each of the following.

$$i^{103}$$

$$-i^{894}$$