

Exercise 27

For the following exercises, solve the equations over the complex numbers.

$$x^2 = -8$$

Solution

To solve for x , take the square root of both sides.

$$\begin{aligned}\sqrt{x^2} &= \sqrt{-8} \\ &= \sqrt{4(-1)(2)} \\ &= \sqrt{4}\sqrt{-1}\sqrt{2} \\ &= 2i\sqrt{2}\end{aligned}$$

Since there's an even power under an even root, and the result is to an odd power, an absolute value sign is needed around x .

$$|x| = 2i\sqrt{2}$$

Remove the absolute value sign by placing \pm on the right side.

$$x = \pm 2i\sqrt{2}$$

Therefore, $x = \{-2i\sqrt{2}, 2i\sqrt{2}\}$.