



Squares and Square Roots

Let's compare equations with squares and square roots.

6.1 Math Talk: Four Squares

Find the solutions of each equation mentally.

- $x^2 = 4$

- $x^2 = 2$

- $x^2 = 0$

- $x^2 = -1$

6.2 Finding Square Roots

Clare was adding $\sqrt{4}$ and $\sqrt{9}$, and at first she wrote $\sqrt{4} + \sqrt{9} = 2 + 3$. But then she remembered that 2 and -2 both square to make 4, and that 3 and -3 both square to make 9.

She wrote down all the possible combinations:

$$2 + 3 = 5$$

$$2 + (-3) = -1$$

$$(-2) + 3 = 1$$

$$(-2) + (-3) = -5$$

Then she wondered, "Which of these are the same as $\sqrt{4} + \sqrt{9}$? All of them? Or only some? Or just one?"

How would you answer Clare's question? Give reasons that support your answer.

Are you ready for more?

- How many solutions are there to each equation?
 - $x^3 = 8$
 - $y^3 = -1$
 - $z^4 = 16$
 - $w^4 = -81$
- Write a rule to determine how many solutions there are to the equation $x^n = m$ where n and m are non-zero integers.

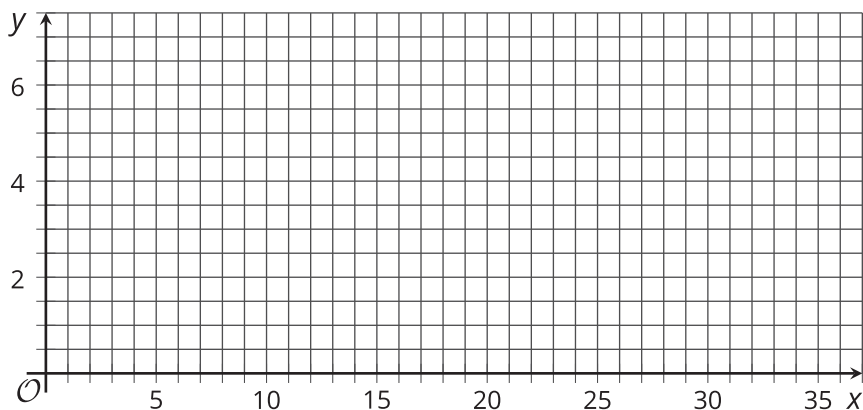
6.3

One Solution or Two?

1. Complete the table.

x	0	1	4	9	16	25	36
\sqrt{x}							

2. Use the values from the table to plot seven points on the graph of $y = \sqrt{x}$. Then sketch the graph by smoothly connecting the points you drew.



3. Is the rule $y = \sqrt{x}$ a function? Explain your reasoning.
4. Explain how you could use the graph to find any solutions to the equation $\sqrt{x} = 5$. How many solutions are there?
5. Use the graph to approximate the value of $\sqrt{5}$. Explain your reasoning.
6. Approximate any solutions to the equation $x^2 = 20$. Explain your reasoning.

Lesson 6 Summary

To avoid confusion, we use the convention that \sqrt{a} represents a single positive number (when a is positive). This allows us to easily describe both solutions to the equation $x^2 = a$. The solutions are \sqrt{a} and $-\sqrt{a}$.

The equation $x^2 = 11$ has two solutions, because $\sqrt{11}^2 = 11$, and also $(-\sqrt{11})^2 = 11$.

The equation $\sqrt{x} = 11$ only has one solution, namely 121.

The equation $\sqrt{x} = \sqrt{11}$ only has one solution, namely 11.

The equation $\sqrt{x} = -11$ doesn't have any solutions, because the left side is positive and the right side is negative, which is impossible, because a positive number cannot equal a negative number.