Lesson 6: Squares and Square Roots

- Let's compare equations with squares and square roots.

6.1: Math Talk: Four Squares

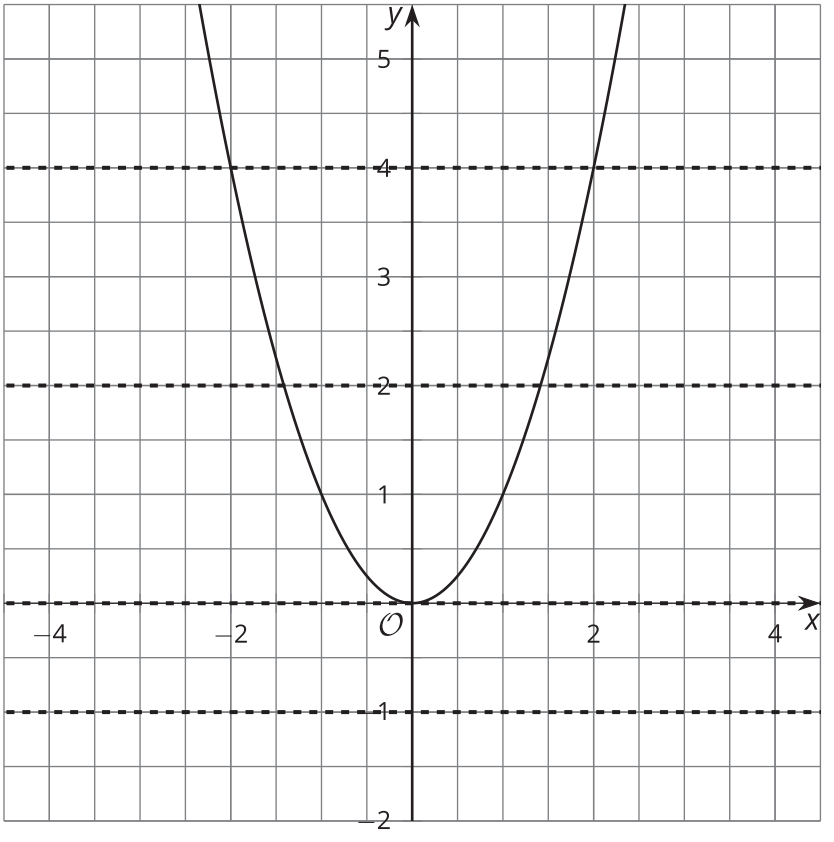
Find the solutions of each equation mentally.

$x^2 = 4$

$x^2 = 2$

$x^2 = 0$

$x^2 = -1$



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?

1. How many solutions are there to each equation?
   a. $x^3 = 8$

   b. $y^3 = -1$

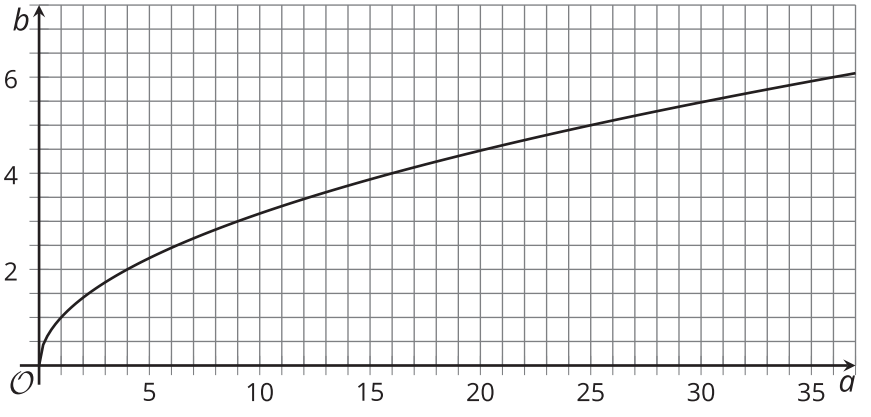
   c. $z^4 = 16$

   d. $w^4 = -81$

2. 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. The graph of $b = \sqrt{a}$ is shown.



a. Complete the table with the exact values and label the corresponding points on the graph with the exact values.

a	1	4	9	12	16	20
$\sqrt{a}$						

b. Label the point on the graph that shows the solution to $\sqrt{a} = 4$.

c. Label the point on the graph that shows the solution to $\sqrt{a} = 5$.

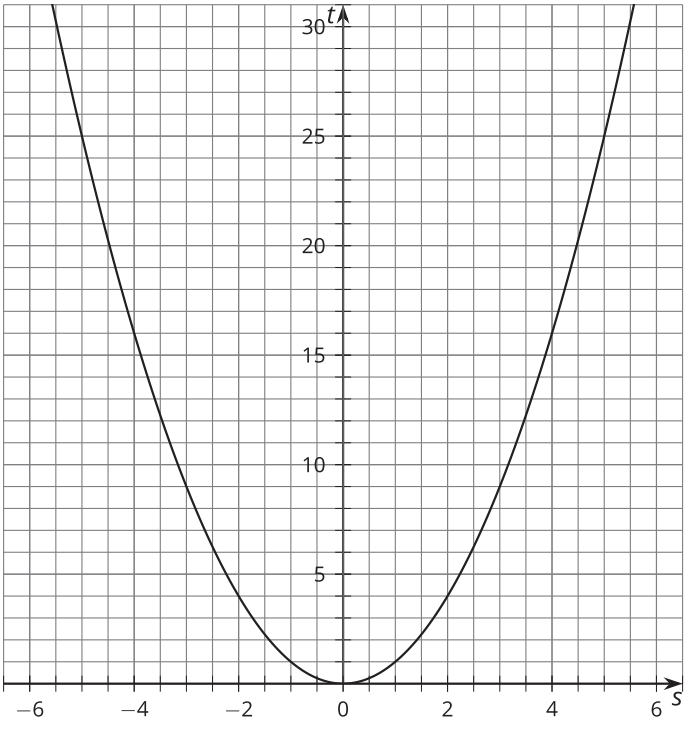
d. Label the point on the graph that shows the solution to $\sqrt{a} = \sqrt{5}$.

2. The graph of $t = s^2$ is shown.

a. Label the point(s) on the graph that show(s) the solution(s) to $s^2 = 25$.

b. Label the point(s) on the graph that show(s) the solution(s) to $\sqrt{t} = 5$.

c. Label the point(s) on the graph that show(s) the solution(s) to $s^2 = 5$.



Lesson 6 Summary

The symbol $\sqrt{11}$ represents the *positive* square root of 11. If we want to represent the negative square root, we write $-\sqrt{11}$.

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

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.