



# Reasoning about Square Roots

Let's approximate square roots.

## 6.1 Math Talk: Squared

Decide mentally whether or not each statement is true.

- $(\sqrt{5})^2 = 5$

- $(\sqrt{9})^2 = 3$

- $(\sqrt{10})^2 = 100$

- $(\sqrt{16}) = 2^2$

## 6.2 Square Root Values

The value of a square root of a number lies between two consecutive whole numbers. Which are those consecutive whole numbers for the following? Be prepared to explain your reasoning.

1.  $\sqrt{7}$

2.  $\sqrt{23}$

3.  $\sqrt{50}$

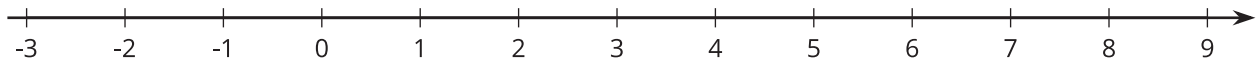
4.  $\sqrt{98}$

### Are you ready for more?

Can we do any better than “between 3 and 4” for  $\sqrt{12}$ ? Explain a way to figure out if the value is closer to 3.1 or closer to 3.9.

## 6.3 Solutions on a Number Line

The numbers  $x$ ,  $y$ , and  $z$  are positive, and  $x^2 = 3$ ,  $y^2 = 16$ , and  $z^2 = 30$ .

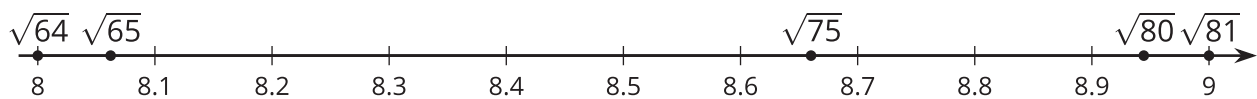


1. Plot  $x$ ,  $y$ , and  $z$  on the number line. Be prepared to share your reasoning with the class.
2. Plot  $-\sqrt{2}$  on the number line.

## Lesson 6 Summary

In general, we can approximate the value of a square root by observing the whole numbers around it and remembering the relationship between square roots and squares. Here are some examples:

- $\sqrt{65}$  is a little more than 8 because  $\sqrt{65}$  is a little more than  $\sqrt{64}$ , and  $\sqrt{64} = 8$ .
- $\sqrt{80}$  is a little less than 9 because  $\sqrt{80}$  is a little less than  $\sqrt{81}$ , and  $\sqrt{81} = 9$ .
- $\sqrt{75}$  is between 8 and 9 (it's 8 point something) because 75 is between 64 and 81.
- $\sqrt{75}$  is approximately 8.67 because  $8.67^2 = 75.1689$ .



If we want to find the square root of a number between two whole numbers, we can work in the other direction. For example, since  $22^2 = 484$  and  $23^2 = 529$ , then we know that  $\sqrt{500}$  (to pick one possibility) is between 22 and 23. Many calculators have a square root command, which makes it simple to find an approximate value of a square root.