Reasoning about Square Roots

Let's approximate square roots.

6.1 Math Talk: Squared

Decide mentally whether or not each statement is true.

- $\left(\sqrt{5}\right)^2 = 5$
- $\left(\sqrt{9}\right)^2 = 3$
- $\left(\sqrt{10}\right)^2 = 100$
- $\left(\sqrt{16}\right) = 2^2$

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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. $\sqrt{50}$

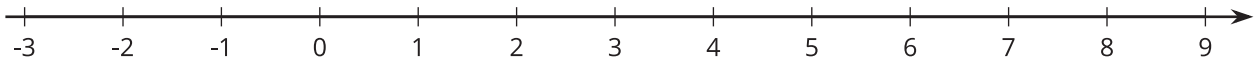
4. $\sqrt{98}$

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.

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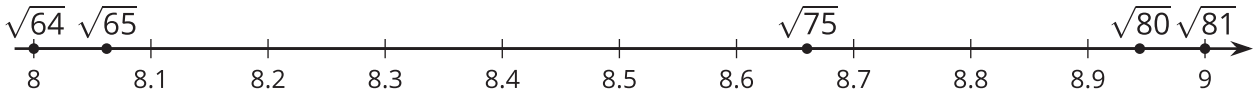
Lesson 6 Summary

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.

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