▶▶ **Multimedia**

A video demonstration of the solution for *Example 1* is provided.

Example 1

Estimate the value of $\sqrt{15}$.

Consider the closest perfect square smaller than 15 and the closest perfect square larger than 15. These two values will serve as **benchmarks** to assist in estimating the value of $\sqrt{15}$. Since the square roots of these perfect square values are $\sqrt{9} = 3$ and $\sqrt{16} = 4$, $\sqrt{15}$ will be between 3 and 4. And, since 15 is closer to 16 than to 9, $\sqrt{15}$ will be closer to 4 than to 3.

Radical	Value
$\sqrt{9}$	3
$\sqrt{15}$	3.8 or 3.9
$\sqrt{16}$	4

Using a calculator, $\sqrt{15} = 3.872983346...$, which shows our estimate in *Example 1* to be quite accurate.

Benchmark
a standard against which something can be compared or measured

Check Up

1. Using benchmarks, estimate the value of $\sqrt{50}$.

Radical	Value
$\sqrt{50}$	

Check: Using a calculator, the decimal form of $\sqrt{50}$ = _____ .

2. Using benchmarks, estimate the value of $\sqrt{21}$.

Radical	Value
$\sqrt{21}$	

Check: Using a calculator, the decimal form of $\sqrt{21}$ = _____.

☑ Compare your answers.

1. Using benchmarks, estimate the value of $\sqrt{50}$.

Radial	Value
$\sqrt{49}$	7
$\sqrt{50}$	7.1
$\sqrt{64}$	8

$\sqrt{50}$ is closer to $\sqrt{49}$ than it is to $\sqrt{64}$

Check: Using a calculator, the decimal form of $\sqrt{50}$ = 7.071067812….

2. Using benchmarks, estimate the value of $\sqrt{21}$.

Radical	Value
$\sqrt{16}$	4
$\sqrt{21}$	4.5 or 4.6
$\sqrt{25}$	5

$\sqrt{21}$ is about half way between $\sqrt{16}$ and $\sqrt{25}$

Check: Using a calculator, the decimal form of $\sqrt{21}$ = 4.582575695….

C. Irrational Numbers and Number Lines

Placing Irrational Numbers on a number line helps to make sense of where they belong in relation to more familiar numbers. Estimation is one tool that can help with this process, but there are others that you will soon see.