Quadratics and Irrationals

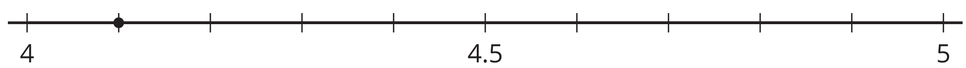
Let’s explore irrational numbers.

20.1 Where Is $\sqrt{21}$?

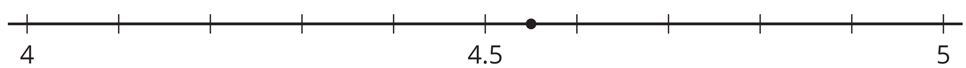
Which number line correctly plots the value of $\sqrt{21}$? Explain your reasoning.

A

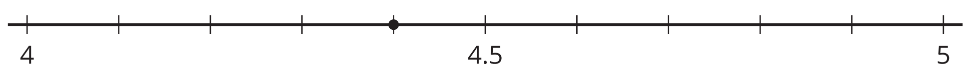
B



C



D



20.2 Some Rational Properties

Rational numbers are numbers that can be expressed as fractions with non-zero denominators.

1. All of these numbers are rational numbers. Show that they are rational by writing them in the form $\frac{a}{b}$ or -$\frac{a}{b}$ for integers a and b.
   a. 6.28
   b. -$\sqrt{81}$
   c. $\sqrt{\frac{4}{121}}$
   d. -7.1234

e. $0.\overline{3}$

f. $\frac{1.1}{13}$

2. All rational numbers have decimal representations, too. Find the decimal representation of each of these rational numbers.

   a. $\frac{47}{1,000}$

   b. $-\frac{12}{5}$

   c. $\frac{\sqrt{9}}{6}$

   d. $\frac{53}{9}$

   e. $\frac{1}{7}$

3. What do you notice about the decimal representations of rational numbers?

20.3 Approximating Irrational Values

Although $\sqrt{2}$ is irrational, we can approximate its value by considering values near it.

1. How can we know that $\sqrt{2}$ is between 1 and 2?

2. How can we know that $\sqrt{2}$ is between 1.4 and 1.5?

3. Approximate the next decimal place for $\sqrt{2}$.

4. Use a similar process to approximate the $\sqrt{5}$ to the thousandths place.