

4.2 Irrational Numbers

LESSON FOCUS

Identify and order irrational numbers.

Number Sets

Natural Numbers: are the numbers you count with and learned in kindergarten

Whole Numbers: are the natural numbers PLUS zero

Integers: positive and negative whole numbers

Rational numbers: any number that can be written in the form $\frac{m}{n}$, where $n \neq 0$

and m and n are integers (also decimals that end or repeat)

Irrational numbers: numbers and CANNOT be written in the form $\frac{m}{n}$, where $n \neq 0$

and m and n are integers (also decimals that do not end or repeat)

Real numbers: all rational and irrational numbers combined

These are rational numbers.

$$\sqrt{100} \quad \sqrt{0.25} \quad \sqrt[3]{8} \quad 0.5$$

$$\frac{5}{6} \quad \sqrt{\frac{9}{64}} \quad 0.8^2 \quad \sqrt[5]{-32}$$

These are not rational numbers.

$$\sqrt{0.24} \quad \sqrt[3]{9} \quad \sqrt{2}$$

$$\sqrt{\frac{1}{3}} \quad \sqrt[4]{12}$$

Use your calculator to determine what is the difference between the rational and irrational numbers.

Which of these radicals are rational numbers?

Which are not rational numbers? How do you know?

$$\sqrt{1.44} \quad \sqrt{\frac{64}{81}} \quad \sqrt[3]{-27} \quad \sqrt{\frac{4}{5}} \quad \sqrt{5}$$

Example 1 Classifying Numbers

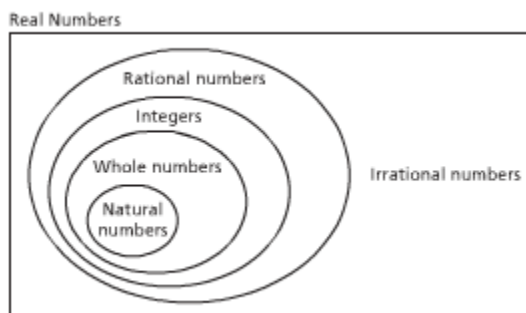
Tell whether each number is rational or irrational. Explain how you know.

a) $-\frac{3}{5}$ b) $\sqrt{14}$ c) $\sqrt[3]{\frac{8}{27}}$



SOLUTION

Use the diagram below to see how the number sets are related.



Example 2

Ordering Irrational Numbers on a Number Line

Use a number line to order these numbers from least to greatest.

$$\sqrt[3]{13}, \sqrt{18}, \sqrt{9}, \sqrt[4]{27}, \sqrt[3]{-5}$$

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