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Identifying Irrational Numbers

Unit 1 Lesson 4

Students will be able to:

Identify irrational numbers

Identifying Irrational Numbers

Key Vocabulary:

Irrational Numbers

Square root

Perfect square root

Identifying Irrational Numbers

An irrational number is a number that cannot be written as the ratio of two integers.

A decimal form of irrational numbers does not stop and does not repeat.

The most common example of this is the number π which you may know is approximately 3.14159 … ….

Sample Problem 1: Determine whether each number is rational or irrational.

a. $3.246\overline{7}$

Sample Problem 1: Determine whether each number is rational or irrational.

a. $3.246\overline{7}$

$3.246\overline{7} = 3.2467777777 \ldots \ldots$

This number is a repeating decimal, so the number is rational.

Sample Problem 1: Determine whether each number is rational or irrational.

b. $12.145678900987654 32 \ldots \ldots \ldots$

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b. $12.145678900987654 32 \ldots \ldots \ldots$

This number is irrational.

Sample Problem 1: Determine whether each number is rational or irrational.

c. $\frac{78}{936}$

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c. $\frac{78}{936}$

$$\frac{78}{936} = \frac{1 * 78}{12 * 78} = \frac{1}{12}$$

Sample Problem 1: Determine whether each number is rational or irrational.

c. $\frac{1}{12} = 1 \div 12 = 0.0833333 \ldots \ldots$

$$\begin{array}{r} -0 \\ \hline 10 \\ -0 \\ \hline 100 \\ -96 \\ \hline 40 \\ -36 \\ \hline 40 \\ -36 \\ \hline 4 \end{array}$$

$$\frac{78}{936} = 0.0833333 \ldots$$

This number is a repeating decimal, so the number is rational.

Sample Problem 1: Determine whether each number is rational or irrational.

d. $\frac{14}{85}$

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d. $\frac{14}{85}$

$\frac{14}{85} = 14 \div 85$

Sample Problem 1: Determine whether each number is rational or irrational.

d.

$$14 \div 85 = 0.16470\ldots$$

$$\begin{array}{r} -0 \\ \hline 140 \\ -85 \\ \hline 550 \\ -510 \\ \hline 400 \\ -340 \\ \hline 600 \\ -595 \\ \hline 50 \\ -0 \\ \hline \end{array}$$

$\ldots\ldots\ldots$

$$\frac{14}{85} = 0.16470\ldots\ldots\ldots$$

This number is irrational.

Square Roots and Irrational Numbers

A square root is the inverse operation of squaring a number.

The symbol for square root is $\sqrt{\ }$ and you should remember some basics such as $\sqrt{\mathbf{25}} = \mathbf{5}$ or $\sqrt{\mathbf{0.81}} = \mathbf{0.9}$ when we take the principal (or positive) square root.

Square Roots and Irrational Numbers

Square roots of perfect squares are always whole numbers, so they are rational.

But the decimal forms of square roots of numbers that are not perfect squares never stop and never repeat, so these square roots are irrational.

Sample Problem 2: Determine whether each square root is rational or irrational number.

a. $\sqrt{324}$

Sample Problem 2: Determine whether each square root is rational or irrational number.

a. $\sqrt{324}$

$\sqrt{324} = 18$

This number is rational.

Sample Problem 2: Determine whether each square root is rational or irrational number.

b. $\sqrt{12}$

Sample Problem 2: Determine whether each square root is rational or irrational number.

b. $\sqrt{12}$

$\sqrt{12} = 3.46410161 \ldots \ldots$

This number is irrational.

Sample Problem 2: Determine whether each square root is rational or irrational number.

c. $\sqrt{3,136}$

Sample Problem 2: Determine whether each square root is rational or irrational number.

c. $\sqrt{3,136}$

$\sqrt{3,136} = 56$

This number is rational.

Sample Problem 2: Determine whether each square root is rational or irrational number.

d. $\sqrt{34}$

Sample Problem 2: Determine whether each square root is rational or irrational number.

d. $\sqrt{34}$

$\sqrt{34} = 5.83095 \ldots \ldots \ldots$

This number is irrational.