We will distinguish between rational and irrational numbers. | **Concept Development**

A **rational number** is **any number** that can be written as a **ratio or fraction**.

An **irrational number** cannot be written as a **ratio or fraction** because they are non-terminating, non-repeating decimals.

Rational Numbers			Irrational Numbers
Integers (not fractions)	**Terminating Decimals$_3$**	**Repeating Decimals**	**(non-repeating, non-terminating decimals)**
$3 = \frac{3}{1}$	$1.4 = \frac{7}{5}$	$0.\bar{3} = \frac{1}{3}$	$\sqrt{2} = 1.4142\ldots$
$\sqrt{4} = \frac{2}{1}$	$-1.5 = \frac{-3}{2}$	$0.\overline{123} = \frac{41}{333}$	$\pi = 3.14159\ldots$
$5^2 = \frac{25}{1}$	$3.79 = \frac{379}{100}$	$-0.\overline{18} = \frac{-2}{11}$	
$0 = \frac{0}{1}$	All terminating decimals are rational	All repeating decimals are rational	
$-12 = \frac{-12}{1}$			

CFU

Select one or more rational numbers that are integers. Explain.

(A) $\sqrt{16}$ (B) $\frac{5}{0}$ (C) 5,020 (D) -77

Select one or more rational numbers that are terminating decimals. Explain.

(A) 1.5 (B) 2.666… (C) -10.5 (D) $0.2\bar{5}$

1 If possible, write the number as a fraction in simplest form.
2 Classify the number as **rational** or **irrational**. If it is rational, classify it as an **integer**, a **terminating decimal**, or a **repeating decimal**.
3 Interpret the answer. *(" ___ is ___ because...")*

1. 4

2. 7

3. -11

4. -9

5. $\frac{10}{5}$

6. $\frac{18}{6}$

7. $\frac{7}{6} = 1.1\overline{6}$

8. $\frac{8}{5} = 1.6$

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9. 0.62

10. $-2.18 = \frac{-218}{100} = \frac{-109}{50}$

11. $-0.\bar{5} = \frac{5}{9}$

12. $-3.\bar{4} = \frac{-31}{9}$

13. $\sqrt{25}$

14. $\sqrt{9}$

15. $\sqrt{3} = 1.73205080\ldots$

16. $\sqrt{5} = 2.2360679775\ldots$

Skill Closure

1 If possible, write the number as a fraction in simplest form.
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3 Interpret the answer. *(" ___ is ___ because...")*

1. $-17 = \frac{-17}{1}$	2. $\frac{100}{25} = \frac{4}{1}$
3. $0.\overline{2} = \frac{2}{9}$	4. $0.241 = \frac{241}{1000}$

Concept Closure

Read and solve the problem.

Quinton classified $\sqrt{15}$ as a rational number and an integer. Is he correct? Explain.

$$\sqrt{15} = 3.87298334621\ldots$$

Summary Closure

What did you learn today about distinguishing between rational and irrational numbers?

Word Bank

rational
ratio
irrational
integer
terminating decimal
repeating decimal
fraction

1 If possible, write the number as a fraction in simplest form.
2 Classify the number as **rational** or **irrational**. If it is rational, classify it as an **integer**, a **terminating decimal**, or a **repeating decimal**.
3 Interpret the answer. *(" ___ is ___ because...")*

1. 21	2. -4
3. -16	4. 50
5. $\frac{32}{4}$	6. $\frac{11}{3} = 3.\overline{6}$
7. $\frac{12}{9} = 1.\overline{3}$	8. $\frac{66}{3}$

1 If possible, write the number as a fraction in simplest form.
2 Classify the number as **rational** or **irrational**. If it is rational, classify it as an **integer**, a **terminating decimal**, or a **repeating decimal**.
3 Interpret the answer. *(" ___ is ___ because...")*

9. $-0.28 = \frac{-28}{100} = \frac{-7}{25}$

10. $1.\overline{7} = \frac{16}{9}$

11. $0.\overline{79} = \frac{79}{99}$

12. $4.51 = \frac{451}{100}$

13. $\sqrt{11} = 3.31662479\ldots$

14. $\sqrt{144}$

15. $\sqrt{81}$

16. $\sqrt{15} = 3.872983\ldots$

Classify numbers as rational or irrational.
If rational, classify as **integer**, **terminating decimal**, or **repeating decimal**.

1. -31	2. $\frac{60}{6}$
3. $\frac{47}{5} = 9.4$	4. $\frac{2}{3} = 0.66\overline{6}$
5. $\sqrt{169} = \frac{13}{1}$	6. $\sqrt{18} = 4.242640...$
7. 0.99	8. -8.6

Choose Yes or No to indicate whether each statement about rational numbers is true or false.

All rational numbers can be written as a ratio of two integers. O Yes O No

All rational numbers are integers. O Yes O No

All whole numbers are rational numbers. O Yes O No

The number -37.5 is a rational number. O Yes O No

Classify numbers as rational or irrational.
If rational, classify as **integer**, **terminating decimal**, or **repeating decimal**.

1. -44	2. $3.\overline{27}$
3. $\frac{15}{5} = 3.75$	4. $\sqrt{90} = 9.486832\ldots$
5. $\sqrt{78} = 8.831\ldots$	6. $\sqrt{400} = 20$
7. $\sqrt{2} = 1.4142\ldots$	8. 5.25

Choose Yes or No to indicate whether each statement about rational numbers is true or false.

All integers are rational numbers. O Yes O No

All fractions are rational numbers. O Yes O No

All repeating decimals are rational. O Yes O No

The number $\sqrt{2}$ is rational. O Yes O No

Classify numbers as rational or irrational.
If rational, classify as **integer**, **terminating decimal**, or **repeating decimal**.

1. $\sqrt{144} = 12$	2. $\sqrt{46} = 6.7823\ldots$
3. 33	4. $\frac{33}{10} = 3.3$
5. $\frac{100}{25} = 4$	6. $\sqrt{101} = 10.0498\ldots$
7. $3.14159\ldots$	8. $3.\overline{14}$

Choose Yes or No to indicate whether each statement about irrational numbers is true or false.

Irrational numbers cannot be written as a ratio of two integers. O Yes O No

All irrational numbers are fractions. O Yes O No

All numbers are irrational numbers. O Yes O No

The number $\sqrt{100}$ is an irrational number. O Yes O No