

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	Repeating Decimals	Decimals with digits that go indefinitely without repeating
$3 = \frac{3}{1}$ $\sqrt{4} = \frac{2}{1}$ $5^2 = \frac{25}{1}$ $0 = \frac{0}{1}$ $-12 = \frac{-12}{1}$	$1.4 = \frac{7}{5}$ $-1.5 = \frac{-3}{2}$ $3.79 = \frac{379}{100}$ All terminating decimals are rational	$0.\bar{3} = \frac{1}{3}$ $0.\overline{123} = \frac{41}{333}$ $-0.\overline{18} = \frac{-2}{11}$ All repeating decimals are rational	$\sqrt{2} = 1.4142\dots$ $\pi = 3.14159\dots$ $\pi = 3.1415926$ 535897932384 $62640\dots$

CFU

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

A $\sqrt{16}$

B $\frac{5}{0}$

C 5,020

D $-7\bar{7}$

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

A 1.5

B 2.666...

C $-10.\bar{5}$

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. $\frac{7}{6}$

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

- 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...”)

9. 0.62

10. -2.18

11. $-0.\bar{5}$

12. $-3.\bar{4}$

13. $\sqrt{25}$

14. $\sqrt{9}$

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

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

Skill Closure

- 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...”)

$$1. \quad -17 = \frac{-17}{1}$$

$$2. \quad \frac{100}{25} = \frac{4}{1}$$

$$3. \quad 0.\bar{2} = \frac{2}{9}$$

$$4. \quad 0.241 = \frac{241}{1000}$$

Concept Closure

Read and solve the problem.

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

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

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. $\frac{11}{3} = 3.\bar{6}$

7. $\frac{12}{9} = 1.\bar{3}$

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. $1.\bar{7} = \frac{16}{9}$

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

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

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

14. $\sqrt{144}$

15. $\sqrt{81}$

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

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. $\frac{2}{3} = 0.6\bar{6}$

5. $\sqrt{169} = \frac{13}{1}$

6. $\sqrt{18} = \sqrt{9 \times 2} = 3\sqrt{2}$

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. Yes No

All rational numbers are integers. Yes No

All whole numbers are rational numbers. Yes No

The number -37.5 is a rational number. Yes 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. $\sqrt{90} = 3 \times \sqrt{10}$

5. $\sqrt{78} = 8.831\dots$

6. $\sqrt{400} = 20$

7. $\sqrt{2}$

8. 5.25

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

All integers are rational numbers.

Yes No

All fractions are rational numbers.

Yes No

All repeating decimals are rational.

Yes No

The number $\sqrt{2}$ is rational.

Yes No

Classify numbers as rational or irrational.

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

1. $\sqrt{144} = 12$

2. $\sqrt{46} = 6.7823\dots$

3. 33

4. $\frac{33}{10} = 3.3$

5. $\frac{100}{25} = 4$

6. $\sqrt{101}$

7. 3.14159...

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.

Yes No

All irrational numbers are fractions.

Yes No

All numbers are irrational numbers.

Yes No

The number $\sqrt{100}$ is an irrational number.

Yes No