

LESSON
4

Rational and Irrational Numbers

Review It!

When you work with rational and irrational numbers, remember these words:

integers the set of whole numbers and their opposites

-5, -1, 0, 1, and 5 are integers.

rational number any number that can be written as a fraction using integers (0 is never the denominator)

irrational number any number that cannot be written as a fraction using integers, such as $\sqrt{7}$, π , and $\sqrt{93}$

repeating decimal a decimal with a repeating digit or group of digits

0.5656... is a repeating decimal because 56 repeats.

terminating decimal a decimal that has a fixed number of digits

0.875 and 0.11111 are terminating decimals.

Fractions, terminating decimals, and repeating decimals are rational.

Which of these are rational numbers: $\frac{3}{4}$, $0.\bar{5}$, $\sqrt{3}$, 0.125?

Step 1 $\frac{3}{4}$ is a fraction, so $\frac{3}{4}$ is a _____ number.

Step 2 Look at the decimals.

0.5 is a repeating decimal, so 0.5 is a _____ number.

0.125 is a terminating decimal, so 0.125 is a _____ number.

Step 3 Square roots of non-perfect squares are irrational.

3 is not a perfect square, so $\sqrt{3}$ is an _____ number.

So, $\frac{3}{4}$, $0.\bar{5}$, and 0.125 are rational, and _____ is irrational.

Try It!

Write *rational* or *irrational* for each number.

Ask Yourself

- | | | | |
|------------------------|---------------------------|-----------------------|-----------------------|
| 1. $\sqrt{100}$
R | 2. 13
R | 3. $\frac{5}{7}$
R | 4. -4
R |
| 5. $\sqrt{25}$
R | 6. $-\frac{2}{3}$
R | 7. $0.\bar{8}$
R | 8. $\sqrt{7}$
I |
| 9. $\sqrt{11}$
I | 10. $2\frac{7}{9}$
R | 11. $2.\bar{3}$
R | 12. -3.5
R |
| 13. $-1.\bar{12}$
R | 14. $11\frac{7}{15}$
R | 15. $\sqrt{23}$
I | 16. $\sqrt{400}$
R |
| 17. π
I | 18. -1
R | 19. 0
R | 20. $\sqrt{71}$
I |
| 21. 15.25
R | 22. 10.325
R | 23. $-\sqrt{51}$
R | 24. $\sqrt{20}$
I |

1.
 $? \times ? = 100$
50, or 10?

2.
 $13 = ?$
 $\frac{13}{1}$, or $\frac{1}{13}$?

Solve.

25. Simplify to determine whether $\sqrt{324}$ is a rational number.

± 18

26. Simplify to determine whether $\sqrt{529}$ is a rational number.

± 23

25.
 $\frac{3}{5} = ?$
3 ÷ 5, or 5 ÷ 3?

On Your Own!

Circle the best answer for each question.

1. Which number is rational?
 A. 925.96
 B. $\sqrt{23}$
 C. π
 D. $-\sqrt{37}$
2. Which number is irrational?
 A. $-\sqrt{100}$
 B. $\frac{31}{57}$
 C. $\sqrt{91}$
 D. $11.3\bar{1}$
3. Which number is rational?
 A. $\sqrt{99}$
 B. $\frac{19}{50}$
 C. $-\pi$
 D. $-\sqrt{62}$
4. Malia wants to compare rational numbers on a number line. Which number is irrational?
 A. $24\frac{2}{5}$
 B. 19.89
 C. $\sqrt{81}$
 D. $-\sqrt{2}$
5. Which number is rational?
 A. $\sqrt{33}$
 B. π
 C. $-\frac{34}{99}$
 D. $-\sqrt{8}$
6. Which number is irrational?
 A. $-\sqrt{144}$
 B. $-\sqrt{101}$
 C. $\sqrt{81}$
 D. $\sqrt{9}$
7. Which number is rational?
 A. $\sqrt{49}$
 B. $\frac{2}{\sqrt{2}}$
 C. $\sqrt{51}$
 D. $-\pi$
8. Logan wants to write numbers as decimals. Which number can she NOT write as a terminating or repeating decimal?
 A. $\frac{3}{500}$
 B. $-\sqrt{144}$
 C. $\sqrt{64}$
 D. $-\sqrt{21}$

9. Which of the following numbers are rational?

$\sqrt{400}, \sqrt{169}, \sqrt{124}, \sqrt{136}$

$$\sqrt{400} = \pm 20 \quad \sqrt{169} = \pm 13$$

10. Which of the following numbers are irrational?

$\sqrt{\pi}, \sqrt{29}, \sqrt{45}, \sqrt{225}$

$$\sqrt{\pi}, \sqrt{29}, \sqrt{45}$$

Math Words

Fill in the blanks

11. Numbers that can be written as fractions using integers are rational numbers.
12. A terminating or repeating decimal is a(n) rational number.
13. A number that cannot be written as a fraction using integers is a(n) irrational number.