

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.

$0.\bar{5}$ is a repeating decimal, so $0.\bar{5}$ 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.

REMEMBER The bar over 5 means that 5 repeats.

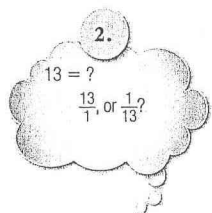
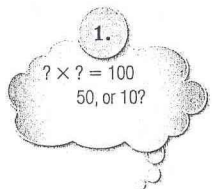
So, $\frac{3}{4}$, $0.\bar{5}$, and 0.125 are rational, and _____ is irrational.

Try It!

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



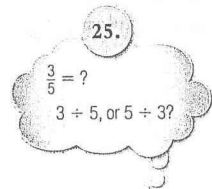
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|-------------------|----------------------|------------------|------------------|
| 1. $\sqrt{100}$ | 2. 13 | 3. $\frac{5}{7}$ | 4. -4 |
| 5. $\sqrt{25}$ | 6. $-\frac{2}{3}$ | 7. $0.\bar{8}$ | 8. $\sqrt{7}$ |
| 9. $\sqrt{11}$ | 10. $2\frac{7}{9}$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



Solve.

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

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



On Your Own!

Circle the best answer for each question.

- Which number is rational?
 - $925.\overline{96}$
 - $\sqrt{23}$
 - π
 - $-\sqrt{37}$
- Which number is irrational?
 - $-\sqrt{100}$
 - $\frac{31}{57}$
 - $\sqrt{91}$
 - $11.3\overline{1}$
- Which number is rational?
 - $\sqrt{99}$
 - $\frac{19}{50}$
 - $-\pi$
 - $-\sqrt{62}$
- Malia wants to compare rational numbers on a number line. Which number is irrational?
 - $24\frac{2}{5}$
 - $19.\overline{89}$
 - $\sqrt{81}$
 - $-\sqrt{2}$
- Which number is rational?
 - $\sqrt{33}$
 - π
 - $-\frac{34}{99}$
 - $-\sqrt{8}$
- Which number is irrational?
 - $-\sqrt{144}$
 - $-\sqrt{101}$
 - $\sqrt{81}$
 - $\sqrt{9}$
- Which number is rational?
 - $\sqrt{49}$
 - $\frac{2}{\sqrt{2}}$
 - $\sqrt{51}$
 - $-\pi$
- Logan wants to write numbers as decimals. Which number can she NOT write as a terminating or repeating decimal?
 - $-\frac{3}{500}$
 - $-\sqrt{144}$
 - $\sqrt{64}$
 - $-\sqrt{21}$

9. Which of the following numbers are rational?

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

10. Which of the following numbers are irrational?

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

Math Words

Fill in the blanks

- Numbers that can be written as fractions using integers are _____ numbers.
- A terminating or _____ decimal is a(n) _____ number.
- A number that cannot be written as a fraction using integers is a(n) _____ number.