LESSON MAKER PRO

Number Type Detective

Classify numbers using roots, fractions, and decimals.

GRADE 8 · 8.NS.A

8.NS.A "Understand that the real number system is composed of rational and irrational numbers."

NAME _____ DATE _____

HOW TO TELL

A rational number can be written as a fraction of integers with a nonzero denominator. Its decimal ends or repeats, while an irrational number's decimal never ends or repeats. The square root of a whole number is rational if that number is a perfect square; otherwise, it is irrational.

WORKED EXAMPLE

Find $\sqrt{121}$. Is it rational or irrational?

1. $11 \times 11 = 121$.
2. So $\sqrt{121} = 11$.
3. Since $11 = 11/1$, it is rational.

Answer: 11; rational

PRACTICE 6 problems

1 Find $\sqrt{49}$. Is it rational or irrational?

ANSWER _____

2 Is $\sqrt{18}$ rational or irrational? Explain using perfect squares.

ANSWER _____

3 Is 0.242424... rational or irrational? Write it as a fraction.

ANSWER _____

4 Is -7/8 rational or irrational?

ANSWER _____

5 Find $\sqrt{(16/25)}$. Is it rational or irrational?

ANSWER _____

6 In 0.101001000100001..., the number of zeros between consecutive 1s keeps increasing. Is this number rational or irrational? Explain.

ANSWER _____

APPLY IT Show your work

1 A square game arena has an area of 100 square meters. What is the length of one side? Is that length rational or irrational?

WORK SPACE

ANSWER _____

2 A music editor shows that one beat lasts 0.666... second, with the 6 repeating forever. Is this time rational or irrational? Write it as a fraction of a second.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A student claims that the sum of two irrational numbers must be irrational. Is the claim true? Give a counterexample using square roots, and explain.

WORK SPACE AND ANSWER

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find √49. Is it rational or irrational?	**7; rational**
2	Is √18 rational or irrational? Explain using perfect squares.	**Irrational; 18 is not a perfect square.**
3	Is 0.242424... rational or irrational? Write it as a fraction.	**Rational; 8/33**
4	Is -7/8 rational or irrational?	**Rational**
5	Find √(16/25). Is it rational or irrational?	**4/5; rational**
6	In 0.101001000100001..., the number of zeros between consecutive 1s keeps increasing. Is this number rational or irrational? Explain.	**Irrational; the decimal neither ends nor repeats.**

PART 2 · APPLY IT

1. **10 meters; rational** The side length is √100 = 10 meters. Since 10 is an integer, it is rational.
2. **Rational; 2/3 second** Let x = 0.666.... Then 10x - x = 6, so 9x = 6 and x = 2/3.

CHALLENGE

No. √2 and -√2 are both irrational, but √2 + (-√2) = 0, which is rational.

Accept equivalent fractions. For the final practice problem, accept an explanation that the increasing gaps of zeros prevent the decimal from repeating.