LESSON MAKER PRO

Real Number Detectives

Sort each number into every real-number set it belongs to.

GRADE 8 · 8.NS.2.b

8.NS.2.b "Classify and explain why a given number is a member of a particular subset or subsets of the real number system."

NAME _____ DATE _____

NUMBER SET CLUES

Natural numbers are positive counting numbers. Whole numbers include 0, integers include negative and positive whole numbers, and rational numbers can be written as a fraction a/b where b is not 0. Irrational numbers cannot be written as a fraction, and every rational or irrational number is real.

WORKED EXAMPLE

Classify -7/12 in every subset of the real number system that applies.

1. -7/12 is already written as a fraction of two integers.
2. Its denominator, 12, is not 0, so -7/12 is rational.
3. All rational numbers are real.

Answer: -7/12 is rational and real.

PRACTICE 6 problems

1 Classify 24 in every subset of the real number system that applies. Explain why.

ANSWER _____

2 Classify 0 in every subset of the real number system that applies. Explain why.

ANSWER _____

3 Classify -15 in every subset of the real number system that applies. Explain why.

ANSWER _____

4 Classify 5/9 in every subset of the real number system that applies. Explain why.

ANSWER _____

5 Classify -2.6 in every subset of the real number system that applies. Explain why.

ANSWER _____

6 Classify sqrt(11) in every subset of the real number system that applies. Explain why.

ANSWER _____

APPLY IT Show your work

1 In an online game, Kai's score changes by -18 points after a penalty. Classify -18 in every subset of the real number system that applies. Explain why.

WORK SPACE

ANSWER _____

2 A square art panel has an area of 20 square inches. The side length is sqrt(20) inches. Classify sqrt(20) in every subset of the real number system that applies. Explain why.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Classify (sqrt(81) - sqrt(25))/sqrt(4) in every subset of the real number system that applies. Show how you know.

WORK SPACE AND ANSWER

ANSWER KEY

Real Number Detectives

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Classify 24 in every subset of the real number system that applies. Explain why.	**24 is natural, whole, integer, rational, and real because it is a positive counting number and can be written as 24/1.**
2	Classify 0 in every subset of the real number system that applies. Explain why.	**0 is whole, integer, rational, and real because it is a whole number and can be written as 0/1.**
3	Classify -15 in every subset of the real number system that applies. Explain why.	**-15 is an integer, rational, and real because it is a negative whole number and can be written as -15/1.**
4	Classify 5/9 in every subset of the real number system that applies. Explain why.	**5/9 is rational and real because it is a fraction of two integers with a nonzero denominator.**
5	Classify -2.6 in every subset of the real number system that applies. Explain why.	**-2.6 is rational and real because it is a terminating decimal and can be written as -13/5.**
6	Classify sqrt(11) in every subset of the real number system that applies. Explain why.	**sqrt(11) is irrational and real because 11 is not a perfect square, so sqrt(11) cannot be written as a fraction of integers.**

PART 2 · APPLY IT

1. **-18 is an integer, rational, and real.** -18 is a negative whole number, so it is an integer. It can be written as -18/1, so it is rational, and all rational numbers are real.
2. **sqrt(20) is irrational and real.** 20 is not a perfect square, so sqrt(20) cannot be written as a fraction of integers. Therefore, it is irrational, and it is also real.

CHALLENGE

(sqrt(81) - sqrt(25))/sqrt(4) = (9 - 5)/2 = 2. It is natural, whole, integer, rational, and real.

Accept equivalent explanations that correctly identify every applicable subset. Students may use an equivalent fraction or decimal form to justify that a number is rational.