

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

CHALLENGE

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

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

- 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.
- $\sqrt{20}$ 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.