

Number Family Tree

Sort numbers into the real number system.

GRADE 8 • 8.NS.2.a

8.NS.2.a "Describe and illustrate the relationships among the subsets of the real number system by using representations (e.g., graphic organizers, number lines). Subsets include rational numbers, irrational numbers, integers, whole numbers..."

NAME _____

DATE _____

HOW THE SETS FIT

Natural numbers begin at 1 and are inside whole numbers. Whole numbers are inside integers, integers are inside rational numbers, and rational numbers are inside real numbers. Irrational numbers are also real, but they are not rational because their decimals do not end or repeat.

WORKED EXAMPLE

Place $-7/3$ in every subset that contains it.

1. $-7/3$ is a ratio of two integers, and its denominator is not 0.
2. So $-7/3$ is rational.
3. $-7/3$ is not an integer because it is not a whole value.
4. Every rational number is real.

Answer: rational number, real number

PRACTICE 6 problems

1 Place 18 in every subset that contains it.

ANSWER _____

2 Place -12 in every subset that contains it.

ANSWER _____

3 Place 0 in every subset that contains it.

ANSWER _____

4 Place $7/10$ in every subset that contains it.

ANSWER _____

5 Is $\sqrt{45}$ rational or irrational? Name every subset that contains it.

ANSWER _____

6 Complete the nesting order: natural numbers $\subset$ _____ $\subset$ _____ $\subset$ _____ $\subset$ real numbers.

ANSWER _____

APPLY IT Show your work

- 1** A music app shows that a song is downloading at 1.125 megabytes per second. Place 1.125 in every subset that contains it.

WORK SPACE

ANSWER _____

- 2** A student makes a square game icon with an area of 20 square centimeters. The side length is $\sqrt{20}$ centimeters. Is this length rational or irrational? Name every subset that contains it.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Write one number for each region of the real-number system: (a) natural, (b) whole but not natural, (c) integer but not whole, (d) rational but not an integer, and (e) irrational.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Place 18 in every subset that contains it.	natural number, whole number, integer, rational number, real number
2	Place -12 in every subset that contains it.	integer, rational number, real number
3	Place 0 in every subset that contains it.	whole number, integer, rational number, real number
4	Place $7/10$ in every subset that contains it.	rational number, real number
5	Is $\sqrt{45}$ rational or irrational? Name every subset that contains it.	irrational number, real number
6	Complete the nesting order: natural numbers $\subset$ _____ $\subset$ _____ $\subset$ real numbers.	whole numbers, integers, rational numbers

PART 2 • APPLY IT

1. **rational number, real number** The decimal ends, so it is rational. Every rational number is real.
2. **irrational number, real number** $\sqrt{20}$ is not a whole-number square root, so it is irrational. Irrational numbers are real.

CHALLENGE

Answers vary. One set of answers is: (a) 3, (b) 0, (c) -2, (d) $5/6$, (e) $\sqrt{7}$.

Accept equivalent forms, such as $1.125 = 9/8$, when the classification is correct. For the challenge, accept any examples that meet each stated condition.