

CRITIQUE & EXPLAIN

Cindy and Victor are playing a math game. The winner must get three in a row of the same type of real number and justify how the numbers are alike. Cindy said she won because she was able to get three rational numbers on a diagonal. Victor said he won with three positive numbers in a column.

The game board is a 3x3 grid. The numbers in the grid are:

1.3		
$\sqrt{10}$	$\frac{2}{5}$	
π		27

A diagonal line is drawn from the top-left cell (1.3) to the bottom-right cell (27). To the left of the grid, Cindy's numbers are -1.6 and $\sqrt{8}$. To the right of the grid, Victor's numbers are $\sqrt{10}$ and 27 .

A. Can both players say they won, for different reasons? Explain.

B. **Reason** Can you make other groups using the numbers shown that are all the same kind of real number? In how many ways can you do this? © MP.2

HABITS OF MIND

Construct Arguments Cindy says that $\frac{1}{3}$ is an irrational number because the fraction form doesn't terminate. Construct an argument to support or refute Cindy's position. © MP.3

**EXAMPLE 1** **Try It!** Understand Sets and Subsets

1. Which numbers in set A are elements in both the subset of odd numbers and the subset of multiples of 3?

HABITS OF MIND

Generalize Can a number of a set also be an element of more than one subset? Explain. © MP.8

EXAMPLE 2 **Try It!** Compare and Order Real Numbers

2. Order each set of numbers from least to greatest.

a. $0.25, \sqrt{\frac{1}{9}}, \frac{6}{25}$

b. $\sqrt{\frac{121}{25}}, 2.25, \sqrt{5}$

**EXAMPLE 3** **Try It! Operations With Rational Numbers**

3. Is the quotient of two rational numbers always a rational number? Explain.

EXAMPLE 4 **Try It! Operations With Rational and Irrational Numbers**

4. Is the difference of a rational number and an irrational number always irrational? Explain.

HABITS OF MIND

Reason When is the square root of a number irrational? Give an example. © MP.2

Do You UNDERSTAND?

- ESSENTIAL QUESTION** How can you classify the results of operations on real numbers?
- Communicate Precisely** Explain why the sum of a rational number and an irrational number is always irrational. © MP.6
- Vocabulary** Are the rational numbers a *subset* of the set of all real numbers? Are the rational numbers a *subset* of the irrational numbers? Explain?
- Error Analysis** Jacinta says that the product of a positive and a negative rational number is always irrational. Explain her error. © MP.3
- Reason** Let $D = \{-2, -1, 0, 1, 2\}$. Is D a subset of itself? Explain. © MP.2

Do You KNOW HOW?

Determine whether set B is a subset of set A .

- $A = \{0, 1, 2, 3, 4\}$ $B = \{1, 2\}$
- $A = \{2, 3, 5, 7, 11\}$ $B = \{3, 5, 7, 9, 11\}$

Order each set of numbers from least to greatest.

7. $\sqrt{200}, 14, \frac{41}{3}$

8. $\frac{2}{3}, \sqrt{\frac{9}{16}}, 0.6$

- The park shown is in the shape of a square. Is its perimeter rational or irrational?

