LESSON MAKER PRO

Rational Numbers: Sets and Positions

Classify, locate, order, and explain rational numbers.

GRADE 6 · TEKS 6.2

6.2 "Number and operations. The student applies mathematical process standards to represent and use rational numbers in a variety of forms. The student is expected to: classify whole numbers, integers..."

NAME _____ **DATE** _____

CONNECT THE REPRESENTATIONS

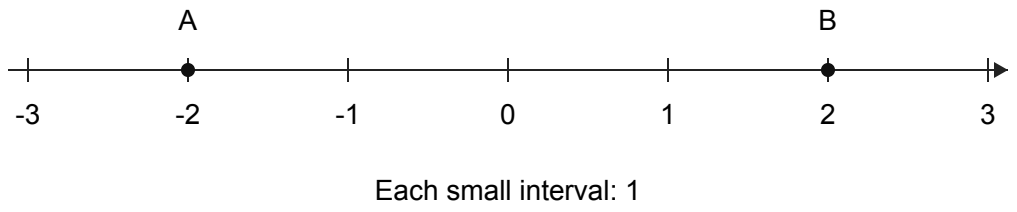
Whole numbers are 0, 1, 2, ... Integers include whole numbers and their negatives. Rational numbers can be written a/b for integers a and b, with b not zero. An opposite is equally far across zero; absolute value is distance from zero.

WORKED EXAMPLE

Locate -2 and its opposite. Give their absolute values.

1. A and B lie 2 units from zero on opposite sides.
2. Distance from zero is never negative.

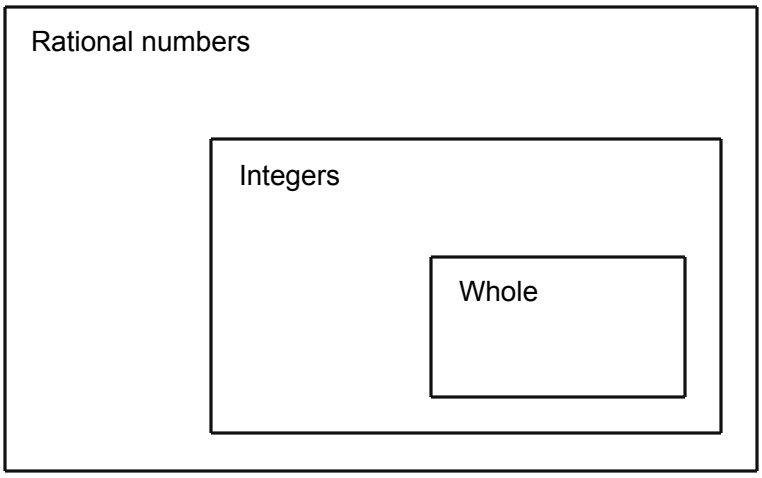
Answer: The opposite of -2 is 2. Both absolute values are 2.



Each small interval: 1

PRACTICE 4 problems

1 Place each value in the smallest region it belongs to: -3, 0, 1/2, 4, -1.25, -8/2. Then explain why 4 also belongs to the two larger sets.

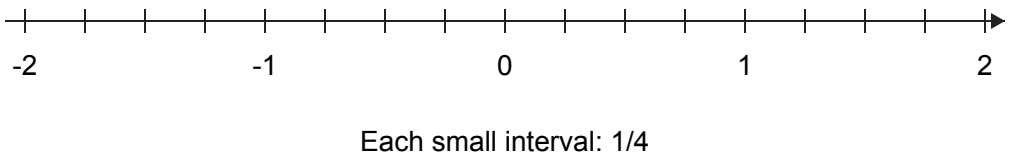


2 Complete the table with each opposite and absolute value. Explain why the absolute value of -1.5 is positive.

DATA TABLE

Number	Opposite	Absolute value
-1.5	___	___
3/4	___	___
0	___	___

3 On the supplied number line, mark A = -1.5, B = -1/2, C = 0.75, D = 1.25. Write all four numbers from least to greatest using < signs.

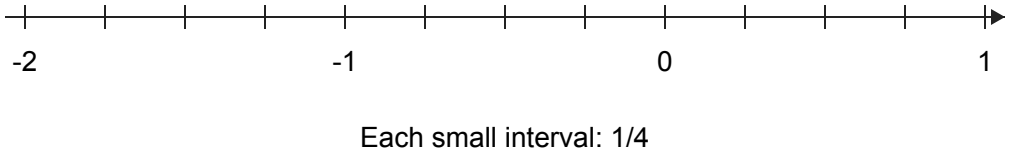


Each small interval: 1/4

4 Rewrite each expression as a division expression and evaluate: 3/4, -7/2, and 8/4. Explain why 3/0 is not a rational number.

APPLY IT Show your work

1 Morning temperatures are -1.5 C, 1/4 C, -0.75 C, and 0 C. Label them A, B, C, D in that order on the number line. List the temperatures from coldest to warmest.



Each small interval: 1/4

2 Two divers are at -2 m and -3.5 m relative to the surface, which is 0 m. Which position is greater? Which diver is farther from the surface? Justify both answers using order and absolute value.

CHALLENGE One step up

A student says, "Every rational number is an integer, and a number has to be positive to have a positive absolute value." Give a counterexample to each claim and correct both statements.

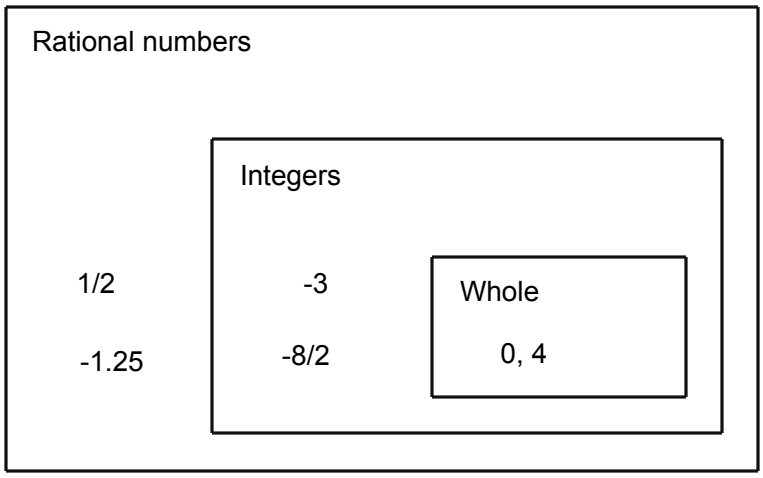
ANSWER KEY

Rational Numbers: Sets and Positions

Equivalent fractional and decimal notation is acceptable. Put each set-classification value only in its smallest region; nesting shows all set memberships. Zero is whole, integer, rational, and its own opposite. Celsius temperatures are labeled C in the student task.

PRACTICE 1

Whole: 0, 4. Integers outside whole: -3, -8/2 (= -4). Rational outside integers: 1/2, -1.25. Every whole number is an integer and can be written over 1.

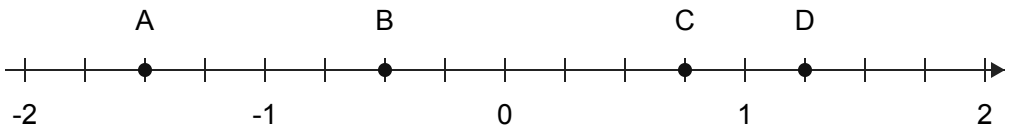


PRACTICE 2

Opposites: 1.5, -3/4, 0. Absolute values: 1.5, 3/4, 0. Distance from zero is nonnegative; -1.5 is 1.5 units away.

PRACTICE 3

-1.5 < -1/2 < 0.75 < 1.25. Points A, B, C, D appear in that left-to-right order.



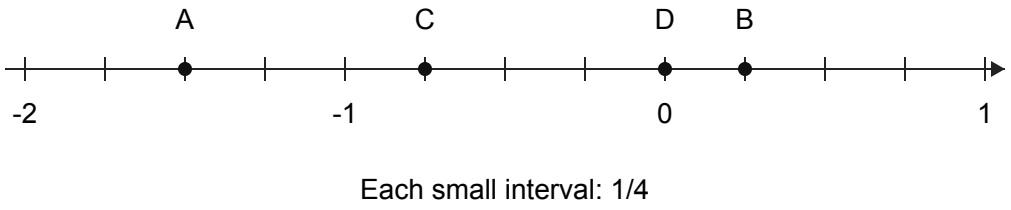
Each small interval: 1/4

PRACTICE 4

3/4 = 3 divided by 4 = 0.75; -7/2 = -7 divided by 2 = -3.5; 8/4 = 8 divided by 4 = 2. Division by zero is undefined.

APPLY IT 1

A(-1.5), B(0.25), C(-0.75), D(0). Coldest to warmest: -1.5 C, -0.75 C, 0 C, 1/4 C.
Check that the representation and explanation agree with the given quantities.



Each small interval: 1/4

APPLY IT 2

-2 > -3.5, so -2 m is the greater position. The -3.5 m diver is farther from the surface because |-3.5| = 3.5 > |-2| = 2.
Check that the representation and explanation agree with the given quantities.

CHALLENGE

1/2 is rational but not an integer; every integer is rational, not the reverse. -3 has absolute value 3; every nonzero number has positive absolute value.