

Rational Number Gaps

Subtract rational numbers and measure distances.

GRADE 7 • 7.NS.A.1c

CCSS.Math.Content.7.NS.A.1c "Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference..."

NAME _____

DATE _____

SUBTRACTING AND FINDING DISTANCE

Subtract a rational number by adding its opposite: $p - q = p + (-q)$. A signed difference can be positive, negative or zero. Distance between positions is the absolute value of their difference, so it is nonnegative. It is zero when both positions are the same.

WORKED EXAMPLE

M is at $-7/8$ and N is at $3/8$. Find $N - M$ by adding an opposite. Then find the distance between M and N.

1. $N - M = 3/8 - (-7/8) = 3/8 + 7/8$.
2. The signed difference is $10/8 = 5/4$.
3. Distance is $|N - M| = |5/4|$. Reversing the order gives $-5/4$, but the same distance.

Answer: $N - M = 5/4$; distance = $5/4$ units.

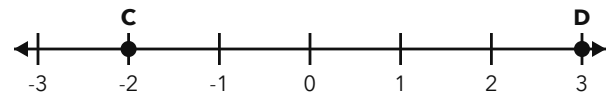


PRACTICE 6 problems

- 1** Rewrite $-2/3 - 5/8$ as addition of an opposite. Then find its value.

ANSWER _____

- 2** The number line shows points C and D. What is the distance between C and D?



ANSWER _____

- 3** Find the value of $4.6 - (-2.9)$.

ANSWER _____

- 4** Rewrite $-5/12 - 7/9$ as addition of an opposite. Then find the value.

ANSWER _____

- 5** The number line shows points E and F. What is the distance between E and F?



ANSWER _____

- 6** Two points are both at $-3/8$. Write their difference as addition of an opposite. Find their distance. Does distance have to be greater than zero?

ANSWER _____

APPLY IT Show your work

- 1** Ari is at height $-1 \frac{3}{4}$ units. Later, Ari is at height $2 \frac{1}{2}$ units. Find the signed change in height (later minus earlier) and the distance between these heights. Can endpoints alone tell the total distance traveled?

WORK SPACE

ANSWER _____

2

Kai is at $-\frac{2}{3}$ and Sam at $1\frac{5}{6}$ on a straight tunnel number line. Find Kai minus Sam and Sam minus Kai by adding opposites. What is the distance between them?

WORK SPACE

ANSWER _____**CHALLENGE** One step up

The equation $|x - (-\frac{3}{10})| = \frac{7}{10}$ describes points that are $\frac{7}{10}$ unit from $-\frac{3}{10}$. Find both possible values of x . Explain why there are two values.

WORK SPACE AND ANSWER

PRACTICE 1

Rewrite $-2/3 - 5/8$ as addition of an opposite. Then find its value.

$$-2/3 + (-5/8) = -31/24 = -1 \frac{7}{24}.$$

PRACTICE 2

The number line shows points C and D. What is the distance between C and D?

5 units

PRACTICE 3

Find the value of $4.6 - (-2.9)$.

7.5

PRACTICE 4

Rewrite $-5/12 - 7/9$ as addition of an opposite. Then find the value.

$$-5/12 + (-7/9); -1 \frac{7}{36}$$

PRACTICE 5

The number line shows points E and F. What is the distance between E and F?

3/4 unit

PRACTICE 6

Two points are both at $-3/8$. Write their difference as addition of an opposite. Find their distance. Does distance have to be greater than zero?

$$-3/8 - (-3/8) = -3/8 + 3/8 = 0. \text{ The distance is 0; distance can be zero.}$$

APPLY IT 1

Signed change: $+4 \frac{1}{4}$ units. Distance between heights: $4 \frac{1}{4}$ units. Total travel cannot be determined from endpoints alone.

$2 \frac{1}{2} - (-1 \frac{3}{4}) = 2 \frac{1}{2} + 1 \frac{3}{4} = 4 \frac{1}{4}$. Its absolute value is $4 \frac{1}{4}$. Extra up-and-down movement could increase total travel.

APPLY IT 2

Kai - Sam = $-2 \frac{1}{2}$; Sam - Kai = $2 \frac{1}{2}$. Their distance is $2 \frac{1}{2}$ units.

$-2/3 + (-11/6) = -15/6$; $11/6 + 2/3 = 15/6$. Both differences have absolute value $5/2$.

CHALLENGE

$x = 2/5$ or $x = -1$. Each value is $7/10$ unit from $-3/10$, one on each side of it.

Require additive-inverse rewrites where requested. Accept equivalent rational forms. Signed changes depend on order; distance does not. Zero distance is valid. Endpoints determine signed change and separation, not necessarily total travel.