

Grade 7 - Adding and Subtracting Rational Numbers - Lesson

Common Core 7.NS.A.1 · maths-pdf.fr/en/

Rational numbers can be added and subtracted on a number line. Adding a positive number moves right and adding a negative number moves left. Subtracting a number is the same as adding its opposite, so $p - q = p + (-q)$. The distance between two numbers is the absolute value of their difference.

Grade 7 · Common Core State Standards: **7.NS.A.1**

Key facts

- Opposites add to 0: $p + (-p) = 0$.
- Same signs: add sizes and keep the sign. Different signs: subtract sizes and keep the sign of the larger size.
- Subtracting q means adding the opposite of q .
- $|p|$ is the distance from p to 0.
- The distance between p and q on a number line is $|p - q|$.

What are rational numbers and opposites?

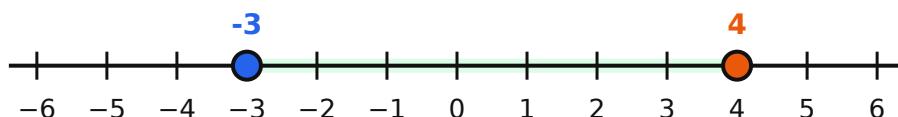
A **rational number** is any number that can be written as a fraction of two integers, such as 3, -2.5 , or $-\frac{3}{4}$. Every rational number has an **opposite** on the other side of 0.

Additive inverse

Opposites like 5 and -5 are the same distance from 0. A number plus its opposite is always 0: $p + (-p) = 0$.

How do you add rational numbers on a number line?

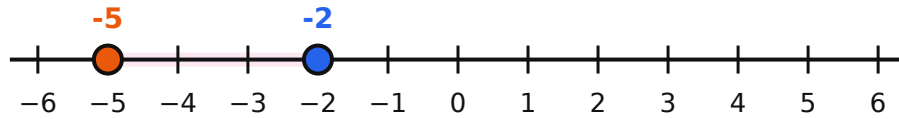
Start at the first number. Move right to add a positive number and left to add a negative number.



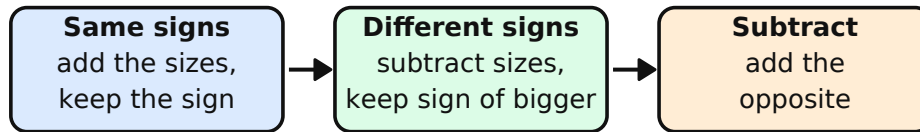
Adding 7 moves right: $-3 + 7 = 4$.

How do you subtract rational numbers?

Subtracting a number is the same as adding its opposite: $p - q = p + (-q)$.



Subtracting 3 moves left: $-2 - 3 = -5$, which equals $-2 + (-3)$.



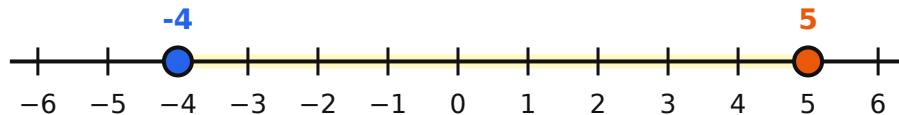
Three rules cover every case.

1. Rewrite subtraction as addition of the opposite.
2. If the signs are the same, add the sizes and keep the sign.
3. If the signs differ, subtract the smaller size from the larger and keep the sign of the number that is farther from 0.

Example. $-\frac{1}{2} - (-\frac{3}{4})$ becomes $-\frac{1}{2} + \frac{3}{4}$. The signs differ, so subtract: $\frac{3}{4} - \frac{2}{4} = \frac{1}{4}$. The positive number is larger in size, so the answer is $\frac{1}{4}$.

How is absolute value a distance?

The **absolute value** $|p|$ is the distance from p to 0. The distance between two numbers p and q is $|p - q|$.



The distance between -4 and 5 is $|5 - (-4)| = 9$.

The same ideas work for decimals: $-3.6 + 8.2 = 4.6$. Line up the decimal points just as you would for positive decimals.

Which mistakes should you avoid?

Mistake	Why it is wrong	Correct work
$-5+8=-13$	The signs differ, so the sizes are subtracted, not added.	$8-5=3$, so $-5+8=3$
$-4-6=2$	Subtracting a positive moves left, away from 0.	$-4+(-6)=-10$
$3-(-2)=1$	Subtracting a negative means adding the opposite.	$3+2=5$

Before you finish, estimate on the number line. If you start at a negative number and add a small positive number, the result should still be negative. This quick check catches most sign errors.

Questions about adding and subtracting rational numbers

What is the rule for adding two negative numbers?

Add the sizes and keep the negative sign. For example, $-6+(-9)=-15$.

Why does subtracting a negative number give a larger result?

Subtracting a negative is the same as adding its opposite. So $-7-(-4)=-7+4=-3$, which is greater than -7 .

What is an additive inverse?

The additive inverse of a number is its opposite, the number that adds with it to make 0. The additive inverse of -2.5 is 2.5 .

How do you find the distance between two numbers?

Subtract them and take the absolute value. The distance between -4 and 5 is $|5-(-4)|=9$.

How do you add fractions with different signs?

Rewrite them with a common denominator, subtract the sizes, and keep the sign of the fraction that is farther from 0. For example, $-\frac{1}{2}+\frac{1}{3}=-\frac{3}{6}+\frac{2}{6}=-\frac{1}{6}$.