

Don't focus on whether it's an addition or subtraction problem. Instead, simplify the expression (take away parentheses), and focus on whether the two numbers have the same sign or opposite signs.

**1. Remove all parentheses first!** Here are example on how to remove parentheses:

$$a + (-b) = a - b$$

$$a - (+b) = a - b$$

$$a - (-b) = a + b$$

$$a + (+b) = a + b$$

because the opposite of positive  $b$  is negative  $b$ .

because the opposite of a negative is a positive.

IDEA: Start at  $a$  on the number line and travel  $b$  units right for “+” and left for “-”.

**2. Combine the numbers.**

A. SAME SIGN: add the magnitudes (absolute values), keep the sign.

$$4 + 9 = 13$$

$$(+5) + (10) = 15$$

$$-4 - 9 = -13$$

$$-5 - 10 = -15$$

These parentheses don't change the meaning of the problem:  $5 + 10 = 15$ .

because  $|-4| + |-9| = 13$  and both are negative.

B. OPPOSITE SIGNS: subtract the smaller magnitude from the larger and keep the sign of the number with larger magnitude.

$$3 - 10 = -7$$

because  $10 - 3 = 7$  and  $-10$  has the larger magnitude.

$$-6 + 8 = 2$$

because  $8 - 6 = 2$ .

$$(+10) - 3 = 7$$

because  $10 - 3 = 7$ .

$$(-8) + (6) = -2$$

because  $8 - 6 = 2$  and  $-8$  has the larger magnitude.

*Now try the following exercises by first rewriting without parentheses.*

$$12 + 6 =$$

$$(6) + (-12) =$$

$$(+6) + (-8) =$$

$$(-6) + (7) =$$

$$5 + (-5) =$$

$$-7 + 7 =$$

$$(-18) + (-20) =$$

$$9 + (+16) =$$

$$5 + (-20) =$$

$$0 + (-10) =$$

$$-7 + 3 =$$

$$15 + (-7) =$$

$$-\frac{4}{3} + (-\frac{5}{3}) =$$

$$-7.32 + 6.54 =$$

$$(-8) + 1 =$$

$$(-\frac{1}{4}) + 6 =$$

$$5 + (-7) + (-8) =$$

$$-2 + 15 + (-10) =$$

$$9 + (-11) + 3 =$$

$$-15 + 15 + 2 =$$

$12 - 6 =$

$(6) - (-12) =$

$(+6) - (-8) =$

$(-6) - (7) =$

$5 - (-5) =$

$7 - 7 =$

$(-18) - (-20) =$

$9 - (+16) =$

$5 - (-20) =$

$0 - 9 =$

$-7 - 3 =$

$8 - 15 =$

$-\frac{7}{8} - (-\frac{19}{8}) =$

$-7.32 - 6.54 =$

$(-8) - 1 =$

$-\frac{1}{4} - 6 =$

$-5 - (-7) - 8 =$

$-2 - 15 - (-10) =$

$9 - (-11) - 3 =$

$5 - 15 - (-2) =$

NOTE: When combining (adding or subtracting) numbers without parentheses, commutativity applies. For example:  $-5 + 12 = +12 - 5 = 12 - 5 = 7$  or  $15 - 20 + 10 = 15 + 10 - 20 = 5$ .

**3 .** As an alternative, you might prefer to think about adding or subtracting. This resembles the explanation in the textbook. Find which conception works for you and stick to it.

To ADD real numbers:

1. Same Signs: add the magnitudes (absolute values), keep the sign.

$(+) + (+) = (+)$ , examples:  $4 + 9 = 13$  and  $(+5) + (10) = 15$ .

$(-) + (-) = (-)$ , examples:  $(-4) + (-9) = -13$  and  $-5 + (-10) = -15$ .

2. Opposite Signs: subtract the smaller magnitude from the larger & keep the sign of the number with larger magnitude.

examples:  $(3) + (-10) = -7$  and  $-6 + 8 = 2$ .

$(+10) + (-3) = 7$  and  $(-8) + (6) = -2$

To SUBTRACT real numbers:

Add the first number and the *opposite* of the second:  $a - b = a + (-b)$ .

examples:  $-12 - 8 = -12 + (-8) = -20$

$6 - 10 = 6 + (-10) = -4$

$-7 - (-20) = -7 + 20 = 13$ , remember  $-(-20) = 20$ .

$30 - 25 = 30 + (-25) = 5$ , nothing new here: positive (*bigger* +) - (*smaller* +).