

Signed Number Operations—Explanation

How to Add, Subtract, Multiply, and Divide Signed Numbers

Absolute value

In order to understand how to treat signed numbers, it is important to know what the term *absolute value* means. *Absolute value* stands for the value of a number as if it had no sign on it. For example, the absolute value of +10 is 10. The absolute value of -4 is 4. The absolute value of 3 is 3. (In the case of the first “3”, the positive sign is not written but is understood to be present on any number that has no sign on it.)

Keep in mind that any number which has no sign in front of it is assumed to be positive. It may help to actually write a positive sign (+) in front of the number while first practicing with signed numbers.

Addition of Signed Numbers

Like Signs

If the two numbers are being added and the two numbers have *like signs* (i.e., both positive or both negative), then **add the absolute values** of the numbers and **keep the sign** of both numbers on the answer.

$$3 + 4 = 7 \quad \text{With parentheses: } (3) + (4) = 7$$

$$-2 + -1 = -3 \quad \text{With parentheses: } (-2) + (-1) = -3$$

Sometimes it is helpful to place parentheses around the signs that are in front of each number. This will help to isolate the addition or subtraction sign in between the two numbers.

Unlike Signs

When two numbers are being added and the signs of the numbers are *different* (i.e., one positive and the other negative), then **subtract the absolute values** of the numbers and **keep the sign of the larger absolute value** on your answer.

$$4 + (-3) = 1$$

$$(-5) + 2 = -3$$

Subtraction of Signed Numbers

Whenever any two signed numbers have a subtraction sign between them, **change the subtraction sign into an addition sign and also change the sign of the second number**, creating its *opposite*.

$$(-2) - (-5) = ? \rightarrow (-2) + (+5) = ? \rightarrow \text{Now it's an addition problem. } (-2) + (5) = 3$$

$$(4) - (8) = ? \rightarrow (4) + (-8) = ? \rightarrow \text{Now it's an addition problem. } (4) + (-8) = -4$$

$$(-1) - (9) = ? \rightarrow (-1) + (-9) = ? \rightarrow \text{Addition problem. } (-1) + (-9) = -10$$

Once you have an addition problem, you can follow the *rules of addition* listed above.

Remember, *subtraction is really addition of the opposite*.

Multiplication and Division of Signed Numbers

The rules for multiplication and division are much easier than the rules for addition and subtraction.

Multiplying or Dividing Numbers With Like Signs

If the signs of the two numbers are both **alike**, the answer is **positive**.

$$3 \cdot 4 = 12 \quad (-2) \cdot (-5) = 10 \quad \frac{-4}{-2} = 2 \quad (-15) \div (-3) = 5$$

$$\frac{8}{4} = 2 \quad \frac{6}{2} = 3$$

Multiplying or Dividing Numbers With Unlike Signs

If the signs of the two numbers are **different**, the answer is **negative**.

$$(5) \cdot (-3) = -15 \quad (-2) \cdot (4) = -8 \quad (12) \div (-4) = -3$$

$$(-25) \div (5) = -5 \quad \frac{18}{-6} = -3 \quad \frac{-14}{7} = -2$$