Dividing signed numbers

As a reminder, signed numbers are positive and negative numbers. When we divide signed numbers, therefore, there are three possible combinations. We could be dividing

1. Two positive numbers
2. Two negative numbers
3. One positive number and one negative number

For each of these combinations, let's talk about what happens when we divide.

When we divide two positive numbers, the result will always be positive.

$$12 \div 3 = 4$$

When we divide two negative numbers, the result will always be positive.

$$(-12) \div (-3) = 4$$

When we divide a positive number by a negative number, or a negative number by a positive number, the result will always be negative.

$$12 \div (-3) = -4$$

$$(-12) \div 3 = -4$$

Here's a summary of our findings:

Positive ÷ Positive	Positive
Negative ÷ Negative	Positive
Positive ÷ Negative	Negative
Negative ÷ Positive	Negative

In other words, if the signs are the same, the result will be positive. But if the signs are different, the result will be negative.

Even though 0 isn't a signed number, it's very important to keep in mind that we can't divide any number by 0. Also, if we divide 0 by any signed number, the result is 0.

$$0 \div 3 = 0$$

$$0 \div -4 = 0$$

Division is often presented "horizontally" with the division symbol, like $6 \div 2 = 3$. Division can also be presented "vertically", like

$$\frac{6}{2} = 3$$

It's also good to get in the habit of enclosing negative numbers in parentheses when you're dividing. You can do this no matter how you write the division, but it's especially important to do it when you're writing the division horizontally.

$$18 \div (-3) = -6$$

$$(-10) \div 5 = -2$$

$$\frac{35}{(-7)} = -5$$

$$\frac{(-8)}{(-4)} = 2$$

In most cases, there's probably no good reason to enclose a positive number in parentheses, but it would be okay to do so.