Multiplying and Dividing Positive and Negative Numbers

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WHAT'S COVERED

In this lesson, you will learn how to determine a product or quotient with positive and negative numbers. Specifically, this lesson will cover:

1. Multiplying and Dividing Positive and Negative Numbers

Multiplication and division of integers both work in a very similar pattern to adding and subtracting. The short description of the process is that we multiply or divide like normal, and if the signs match (both positive or both negative) the answer is positive. If the signs don't match (one positive and one negative), the answer is negative.

1a. Matching Signs

Here are examples of multiplication and division of integers with matching signs:

$-2(-6)$	Signs match, answer is positive
12	Our Solution
$\frac{-36}{-9}$	Signs match, answer is positive
4	Our Solution

In each example, since the two integers have matching signs, we multiply or divide the two numbers, and write the product or quotient as a positive number.

BIG IDEA

The product or quotient of two positive numbers is positive. The product or quotient of two negative numbers is also positive.

1b. Opposite Signs

Here are some examples of multiplication and division of integers with opposite signs:

$(4)(-6)$ Signs do not match, answer is negative

-24 Our Solution

$\frac{15}{-3}$ Signs do not match, answer is negative

-5 Our Solution

In these examples, the two integers have opposite signs: one is positive and the other is negative. We multiply or divide the two numbers, and write the product or quotient as a negative numbers.

BIG IDEA

The product or quotient of a positive and negative number is negative.

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2. Considerations

There are a few things to be careful of when working with integers. First, be sure not to confuse a problem like $-3-8$ with $-3(-8)$.

- The first problem, $-3-8$, is subtraction, because the subtraction separates -3 from what comes after it.
- The second problem, $-3(-8)$, is a multiplication problem, because there is nothing between the 3 and the parenthesis. If there is no operation written in between the parts, then we assume that means we are multiplying.

Another item to watch out for is to be careful not to mix up the pattern for adding and subtracting integers with the pattern for multiplying and dividing integers. They can look very similar, for example if the signs match on addition, we keep the sign, even if it is negative: $-3+(-7)=-10$. However, if the signs match in multiplication, the answer is always positive: $(-3)(-7)=21$.

HINT

As you work through multiplication problems in this course, you will see many different ways to express multiplication. Some problems may use the times sign (4×7), a dot ($5\cdot 6$), or sometimes even parentheses ($2(3)$). They all mean the same thing, that you will multiply the values together. Here are a few more instances:

Times	Dot	Parentheses
$4\times 2=8$ $3\times 7=21$ $5\times 9=45$	$4\cdot 2=8$ $3\cdot 7=21$ $5\cdot 9=45$	$4(2)=8$ $3(7)=21$ $5(9)=45$

SUMMARY

The big idea that **multiplying or dividing by a negative number** changes the sign of the product or quotient. When the **signs match**, for instance, when we multiply or divide two positive numbers, the answer is positive. When we multiply or divide by two negative numbers, the answer is also positive.

However, when the **signs are opposite**, for instance, when we multiply or divide a positive number and a negative number, the answer is negative. Some **considerations** when adding, subtracting, multiplying, or dividing numbers include making sure you don't confuse an addition problem with a multiplication problem. Also that you don't mix up the patterns for adding and subtracting with the patterns for multiplying and dividing.