



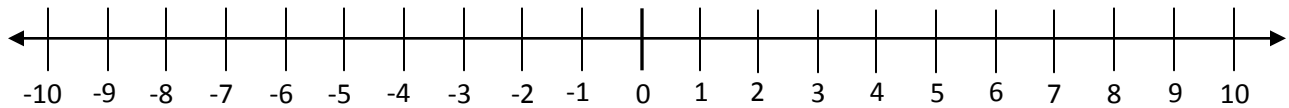
Operations with Integers

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What are integers?

Integers are zero and all the positive and negative whole numbers. When you first begin to work with integers, imagine a tremendously large line that extends infinitely left and right. Now, directly in front of you is a spot on that line we will call the center and label it zero. To the left are all the negative numbers and to the right all the positive.



Adding Integers

Integers with the Same Sign

Adding integers that have the same sign is pretty straightforward. Add the two numbers together and maintain the sign.

Example: $200 + 500 = 700$

Both numbers are positive so we add the numbers together and number remains positive.

Example: $-300 + (-900) = -1,200$

Both addends are negative, so we add them together and maintain the negative sign.

Integers with Different Signs

When adding integers with different signs, ignore the signs at first and subtract the smaller number from the larger. The final sum will maintain the sign of the larger addend.

Example: $-3 + 8 = 5$

Since we are adding two numbers with different signs, ignore the signs and we are left with 3 and 8. The number 3 is smaller than 8 so we subtract 3 from 8 which give us 5. Of the two addends, 8 was the larger and was positive, so the final sum will be positive. Thus, our final sum is 5.

Example: $-50 + 18 = -32$

In this example, when we ignore the signs, the number 50 is greater than 18. Therefore, subtract 18 from 50 which gives you 32. Since 50 is the greater number and is negative, the sum will be negative; thus the final sum is -32 .



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Sign of Addend 1	Sign of Addend 2	Sign of Sum	How to Compute Sum
+	+	+	Add
-	-	-	Add
+	-	Sign of larger addend	Subtract smaller addend from the larger
-	+	Sign of larger addend	Subtract smaller addend from the larger

Subtracting Integers

To subtract integers, we will follow some steps that will transform the subtraction problem into an addition problem. We then can follow the rules of addition.

Recall that in a subtraction problem, there are three parts: the minuend or the number being subtracted from, the subtrahend or the number you are subtracting and the difference which is your solution.

$$\begin{array}{r} 15 \quad \text{minuend} \\ -6 \quad \text{subtrahend} \\ \hline 9 \quad \text{difference} \end{array}$$

When subtracting integers, we will change the sign of the subtrahend and then follow the rules of addition.

Example:

$14 - (-4)$ Change the sign of the subtrahend,

$14 + 4$ Then add the two integers.

28 Since we are adding two integers of the same sign, we add and maintain the sign.

Example:

$-22 - 4$ In this problem, we are subtracting 4 from -22 .

$-22 - (+4)$ The subtrahend 4 is positive. So we can rewrite the problem for clarity.

$-22 + (-4)$ Change the sign of the subtrahend; then add.

-26 Both numbers are negative so we add and maintain the sign.



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Example:

$-49 - (-15)$ Subtract -15 from -49 .

$-49 + (+15)$ Change the sign of the subtrahend then add.

34 Since one number is negative and the other positive, we remove the signs and subtract the smaller number from the larger

-34 Since the sign of the larger number was negative, the final answer is negative.

Multiplying and Dividing Integers

Multiplying and dividing integers is also similar to the multiplying and dividing you have done in the past. The only difference is that with integers, you must beware of which sign to apply to the final answer. The rules for determining the sign are pretty straightforward: If the signs of the numbers you are multiplying or dividing are the same, then the answer will be positive. If the signs are different, then the answer will be negative.

The following chart shows the rules as it relates to multiplication.

Sign of Multiplicand 1	Sign of Multiplicand 2	Sign of Product
+	+	+
-	-	+
+	-	-
-	+	-

Division has its own chart, but still follows the same rules:

Sign of Divisor	Sign of Dividend	Sign of Quotient
+	+	+
-	-	+
+	-	-
-	+	-



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Multiplication Examples:

- $4 \times 3 = 12$ Here is a positive number times a positive number, so the answer is positive.
- $-4 \times -3 = 12$ Here is a negative number times a negative number, so the answer is positive.
- $-4 \times 3 = -12$ This is a negative number times a positive number, so the answer is negative.
- $4 \times -3 = -12$ Last is a positive number times a negative number, so the answer is negative.

Division Examples:

- $15 \div 3 = 5$ Here is a positive number divided by a positive number, so the answer is positive.
- $-15 \div -3 = 5$ Here is a negative number divided by a negative number, so the answer is positive.
- $-15 \div 3 = -5$ This is a negative number divided by a positive number, so the answer is negative.
- $15 \div -3 = -5$ Last is a positive number divided by a negative number, so the answer is negative.

References

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