

Math, you can do it!

Integers - adding

by Bill Hanlon

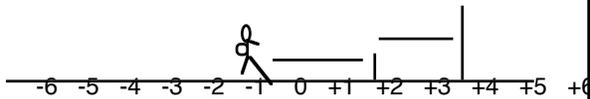
Integers - are positive and negative whole numbers, i.e. $\{ \dots -3, -2, -1, 0, 1, 2, 3, \dots \}$

When we work with signed numbers, we are working with two different signs that look exactly alike. One is a sign of operation, the other is a sign of value.

$$\begin{array}{ccc}
 & \text{sign of operation} & \\
 (+3) & + & (+2) \\
 & \text{signs of value} &
 \end{array}$$

A sign of operation tells you to add, subtract, multiply or divide. A sign of value tells you whether the number is positive or negative.

One way to explain how to add integers is with a number line. Let's say I was standing on zero and walked three spaces to the right, then walked two more spaces to the right. Where would I be?



Now let's define walking mathematically as addition.

When the sign of value is positive, we walk to the right, when it's negative, we walk to the left.

So, in our example when we walked three places to the right, we could label that as 3R or +3. Two places to the right would be labeled 2R or +2.

Translating that problem mathematically, we have

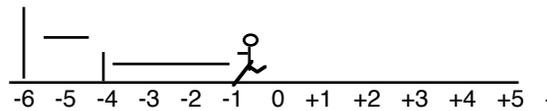
$$\begin{array}{r}
 3R + 2R = 5R \\
 (+3) + (+2) = +5
 \end{array}$$

Rather than always relying on drawing a picture, we'll make the following rule for adding integers.

Rule 1. To add two positive numbers, find the sum of their absolute values, the answer is positive.

Example $(+7) + (+5) = +12$

Using the same agreements we just made, walking is still defined by addition, going right is positive, left is negative. Let's see what happens when we walk four steps to the left, then two more to the left.



Mathematically, we'd express $4L + 2L = 6L$

$$(-4) + (-2) = -6$$

If we did enough of these, that would lead us to another rule.

Rule 2. To add two negative numbers, find the sum of their absolute values, the answer is negative.

Example $(-9) + (-6) = -15$

What would happen if I walked 4 places to the right, then 6 places to the left?

Drawing the picture, you might see I should end up 2 places to the left. Mathematically, we have

$$4R + 6L = 2L \quad \text{or} \quad (+4) + (-6) =$$

Rule 3. To add one positive and one negative number, find the difference in their absolute values and use the sign of the integer with the greater absolute value

Example $(-12) + (+7) = -5$