

On the multiplication of negative numbers

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It might seem strange to consider this plebian topic in a newsgroup having to do with such an esoteric subject at the theory of relativity, But, believe it or not, a controversy has arisen between certain frequent posters in this newsgroup as to the result of multiplying negative numbers, a topic generally treated in the U.S. educational system before the 6th year (12-year-olds).

Numbers have interested people for both practical purposes and amusement for centuries. The negative numbers arose to provide solutions to questions such as "What number, if any, added to 5 gives 3?" Before the invention of negative numbers, there was no such number. With negative numbers admitted, there is.

Negative numbers pose no problem in addition and subtraction. And multiplication of a negative number by a positive integer is quickly understood as repeated addition. But multiplication of two negative integers is not so quickly dismissed as a problem. I admit that I groped for a while to think of a way to make the solution obvious in terms of more elementary operations. One doesn't want to say: It's a rule! Obey it!

The way I came up with may not be simplest (if you know something simpler, tell me about it), but it works:

Consider $5 * 5 = 25$. If one is silly enough to write 5 as $6+(-1)$, one would have
 $(6+(-1))*(6+(-1))=25$

By the distributive law, one could expand that to

$$6*6 + 6*(-1) + (-1)*6 + (-1)*(-1) = 25$$

We all agree that $6*6=36$. Now $6*(-1) = (-1)+(-1)+(-1)+(-1)+(-1)+(-1)$ which reasonable people will agree amounts to -6 . Similarly $(-1)*6 = -6$ again. So far, we have

$$25 = 36 + (-6) + (-6) + (-1)*(-1)$$

or

$$25 = 24 + (-1)*(-1)$$

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which shows that $(-1)*(-1) = 1$. Ta-dah!

As a gift, we get $\text{sq.rt.}(1) = -1$, Of course we already knew that $1*1=1$, so we have discovered by this simple and obvious means that numbers can have two different square roots.

$\text{sq.rt.}(16) = 4$ or -4 .

Don't laugh, anyone. There is a debate on this matter in one of the threads in [sci.physics.relativity](#).

I expect that any rational person who did not understand the multiplication of negative numbers, will now accept the result that a negative times a negative is a positive. That leaves room for the rest of us (non-rational) to continue the debate, but maybe now we can draw the curtain on that debate without any accusation of cruelty.

Uncle Ben

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