



## Multiplying Negative Numbers

When multiplying and dividing negative numbers, I wanted to see if I could create a technique whereby I could calculate using **only the positive numbers** and still come up with the correct negative answer. This is what I've come up with. Using this technique, the only time you'll have to work with the negative complement is;

- i) If your problem begins with a negative number, it'll need to be placed correctly on the soroban.
- ii) If the answer is a negative, obviously you'll need to be able to read it.

The reason I like this is, I can do all the work using actual positive numbers while the negative complementary numbers underneath work themselves out naturally of their own accord. I find the technique particularly beneficial if I have to multiply larger numbers such as  $-58 * 37 = -2146$  (see Example 2 below), or when doing a long string of calculations that might include a combination of something like:  $(98 - 140)6 \div 7 + 78 = 42$ .

The following technique has its little quirks and although it does seem to work, I can't explain why (See [Gary Flom's Explanation](#))

The method works best using a modern 1:4 bead soroban and will use two Japanese soroban techniques:

- Techniques for solving problems involving negative numbers
- Techniques for solving problems of multiplication

Remember to follow Kojima's rules for reading negative numbers. In order to see the true complement, 1 is always added to the right-hand most rod that shows value.

In the following examples the parenthesized (\*\*) numbers are the positive numbers actually displayed on the soroban. For example if -12 were the negative complementary number, (88) would be the number displayed.

### Example 1: $5 -12 * 8 = -56$

Step 1: Place 5 on the soroban

Step 2: Subtract 12 to equal -7(3).

Step 3: Now  $-7(3) * 8 ==>$  Here's the trick. Rather than multiplying  $-7 * 8$ , multiply  $(3) * 8$  to equal (24) instead. The negative complementary number at this point is -76 while the number displayed on the soroban is (24).

Step 4: \*\*\*Here's the quirk\*\*\* Now you must subtract the multiplier from the \*\*first number in the product\*\*. In this example 8 is the multiplier, so subtract 8 from the 2 on rod B. This is not possible, so solve it by adding 1 to rod A and then subtracting 8 from rods AB. (see below).

<b>A</b>	<b>B</b>	<b>C</b>	
	2	4	
-8			==> ??? (can't be done)

