

Subtracting Integers Using the Chip Model

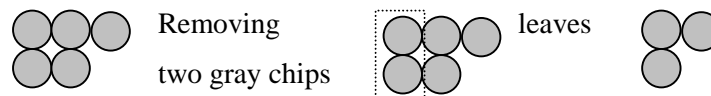
Previously, you used number patterns and number lines to make sense of the subtraction of negative numbers. You can also interpret subtraction using gray and white chips.

Perform chip subtraction by taking away chips.

Example:

$$5 - 2$$

Place 5 gray chips on the table and then take away 2 of them. Since there are 3 gray chips left, the answer to $5 - 2$ is 3.



The next example shows what happens when you subtract a negative number.

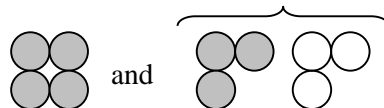
Example:

$$4 - (-3)$$

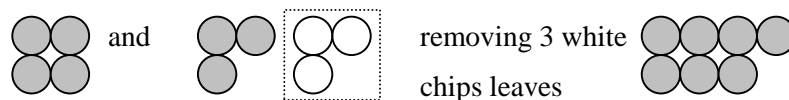
There are 4 gray chips to start. The problem says to take away 3 white chips, but there are no white chips to remove.



Since there are no white chips to remove, introduce to the pile of 4 gray chips what amounts to zero; that is, 3 gray chips and 3 white chips. Now there will be exactly the right number of white chips to take away.



Notice that it still amounts to 4, because only the quantity zero was added. Now, remove 3 negative (3 white) chips from the pile. The result is 7 gray (positive chips).



So, $4 - (-3) = 7$

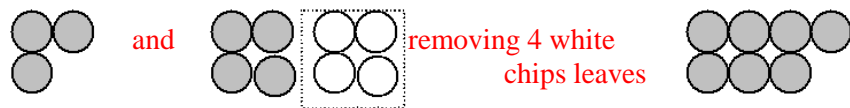
Part 1 – The Chip Model

1. Do these subtraction problems using chips. Draw the chips for each problem.

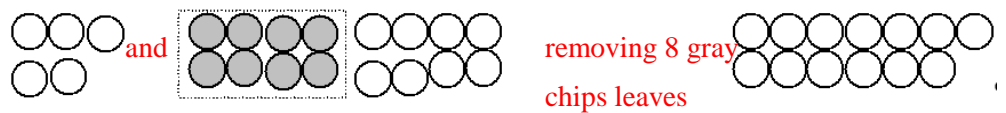
a. $6 - (-3) = 9$



b. $3 - (-4) = 7$



c. $-5 - 8 = -13$



Part 2 – The Checking Account Analogy

For the checking account analogy, consider the following scenario to make an analogy for subtracting a negative number: *The Return of The Sweater*. You bought a sweater for \$50. After that purchase you have \$150 in your checking account. You return the sweater (it doesn't match your eyes after all) to the store. Here are two ways to represent the return of the sweater:

Way A: $150 - (-50)$

Way B: $150 + (50)$

2. Explain how Way A and Way B each can represent your checking account transactions for the return of the sweater.

Possible interpretations for Way A:

Returning the check to the purchaser.

Or Erasing a $-\$50$ entry in the checkbook register.

Possible interpretations for Way B:

The store gave the purchaser \$50 in cash.

Or the store credited the purchaser's account for \$50.

3. Do these subtraction problems using the *Return of The Sweater* scenario.

a. $120 - (-30) = 150$

A check for \$30 was returned to the purchaser.

b. $-50 - (-70) = 20$

The purchaser erased the $-\$70$ entry in the check register.

c. $-400 - (-80) = -320$

The purchaser erased the $-\$80$ entry in the check register.

4. Imagine that you received a report of transactions, but one digit in each number was smudged (♣) and unreadable. For each of the following, determine whether the result will be positive, zero, negative, or impossible to determine.

a. $-2♣21 - 47♣3$

negative

b. $7♣00 - (-36♣8)$

positive

c. $-4♣68 - (-71♣)$

negative

d. $4♣8 - (4♣8)$

impossible to determine

5. In subtracting, with what combination of numbers will the checking account balance end up positive?

If you have money in your checking account, returning the sweater will keep the balance positive.

If you had an account that was overdrawn by an amount less than the cost of the sweater, returning the sweater will return the balance to positive.