Issues with Integers? Self-Help Guide!

Subtracting Integers

Subtraction is usually introduced as "taking away" the amount to be subtracted. In other words, 5 – 2 means that 2 is "taken away" from 5. That connection will be used initially to explore subtraction with integers. Recall that positive numbers are designated with black chips or circles and negative numbers are designated with red chips or circles.

Example #9: 5 – 2

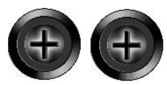
 = 3

Example #10: (−5) – (−2)

 = −3

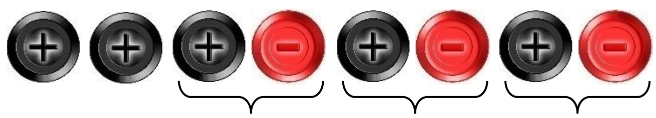
The above examples might suggest that the subtraction of two positive numbers produces a positive number and the subtraction of two negative numbers produces a negative number. However consider the following two examples:

Example #11: 2 – 5

Begin with +2 (2 black chips): 

In order to subtract +5 (or take away five black chips), three more black chips would be needed. Add three zeros which are three black-and-red pairs.

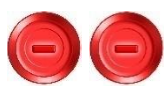
2 + 0 + 0 + 0 = 2

Add 3 zeros: 

1 + (−1) = 0 1 + (−1) = 0 1 + (−1) = 0

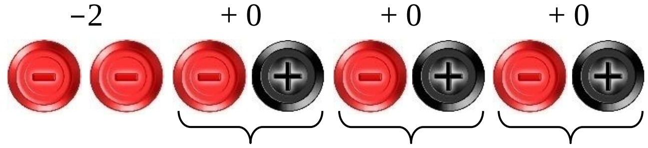
Subtract 2 – 5 by taking away five black chips:  = −3

Example #12: (−2) – (−5)

Begin with −2 (2 red chips): 

In order to subtract −5 (or take away five red chips), three more red chips would be needed. Add three zeros which are three red-and-black pairs.

−2 + 0 + 0 + 0 = −2

Add 3 zeros: 

−1 + 1 = 0 −1 + 1 = 0 −1 + 1 = 0

Subtract −2 – (−5) by taking away five red chips:  = 3

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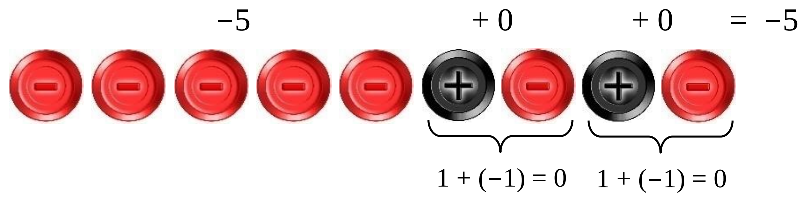
It is clear that the subtraction of two positive numbers does not always produce a positive number and the subtraction of two negative numbers does not always produce a negative number.

Example #13: (−5) – 2

Begin with −5 (5 red chips):

In order to subtract +2 (or take away two black chips), two black chips would be needed. Add two zeros which are two black-and-red pairs.

Add 2 zeros:



Subtract −5 – 2 by taking away 2 black chips:

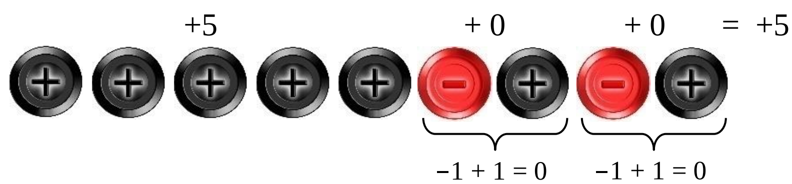
In the above example, to subtract 2 black chips, 2 black-and-red pairs were added. When the 2 black chips were eliminated, 2 red chips had been added. So subtracting +2 was the same as **adding the opposite**, −2.

Example #14: 5 – (−2)

Begin with +5 (5 black chips):

In order to subtract −2 (or take away two red chips), two red chips would be needed. Add two zeros which are two red-and-black pairs.

Add 2 zeros:



Subtract −2 by taking away 2 red chips:

In the above example, to subtract 2 red chips, 2 red-and-black pairs were added. When the 2 red chips were eliminated, 2 black chips had been added. So subtracting −2 was the same as **adding the opposite**, +2.

Subtraction is often redefined as “adding the opposite.” Rather than continue to add zeros and “take away,” it is now simpler to rewrite subtraction as “adding the opposite.” Review Examples 9 through 14, comparing the original method of “taking away” with rewriting subtraction as “adding the opposite.”

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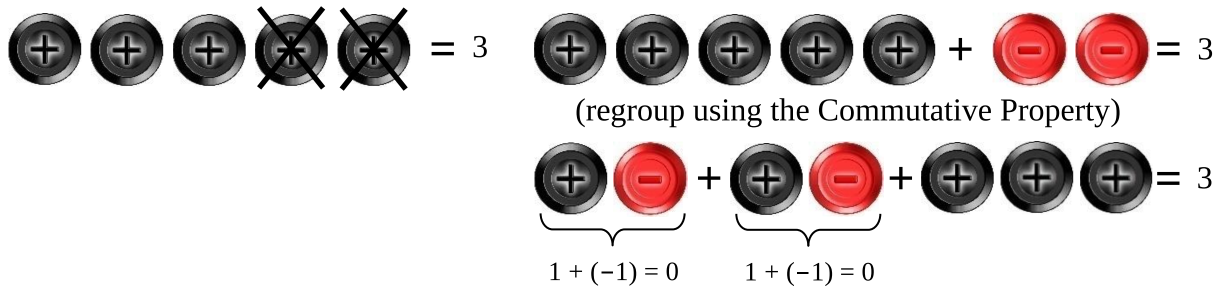
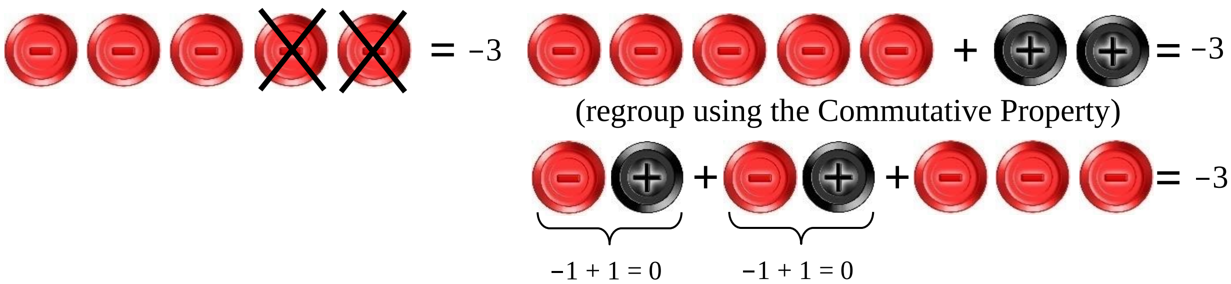
Repeat of Example #9: 5 – 2

5 "take away" 2 OR Rewrite **5 – 2** as **5 + (−2)** (Add the opposite)



Repeat of Example #10: (−5) – (−2)

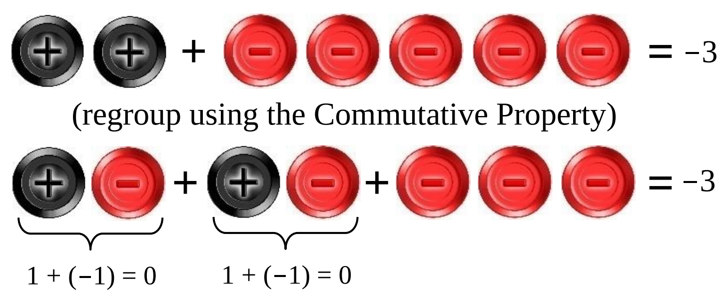
−5 "take away" −2 OR Rewrite **(−5) – (−2)** as **−5 + (+2)** (Add the opposite)



Examples 11 through 14 which were shown on the previous two pages and simplified by "taking away" will now be completed by rewriting subtraction as "add the opposite."

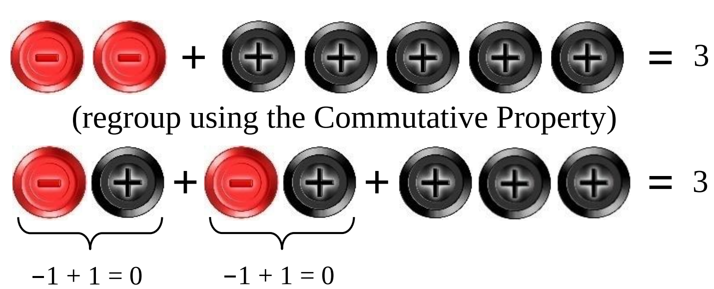
Repeat of Example #11: 2 – 5

Rewrite **2 – 5** as **2 + (−5)**: (Add the opposite)



Repeat of Example #12: (−2) – (−5)

Rewrite **(−2)** – **(−5)** as **(−2)** + **(+5)**: (Add the opposite)



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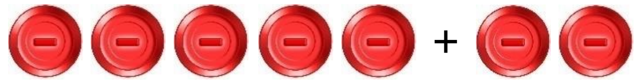
Repeat of Example #13: (−5) – 2

Add the opposite

Rewrite **(−5)** – **2** as **(−5)** + **(−2)**:


= −7

Repeat of Example #14: 5 – (−2)

Add the opposite

Rewrite **5** – **(−2)** as **5** + **(+2)**:


= 7

Note that subtracting a negative number from a positive number will always produce a positive number. Generating "rules" based on pattern recognition is a valuable mathematical process. The rules for combining integers, which can differ from textbook to textbook, are not presented here to allow students to focus on the concepts rather than the "rules" and, if appropriate, make connections and then generalize their findings, building solid math skills.

It is often noted that the sign refers to the term that it precedes. In other words, 2 – 5 from Example 11 is visualized as 2 + (−5) without rewriting and (−5) – 2 from Example 13 is visualized as (−5) + (−2) again without rewriting. It would only be necessary to rewrite the subtraction of a negative number such as those in Examples 12 and 14 if this concept is applied.

To summarize: when adding numbers with the same sign, the answer will have that same sign. When subtracting numbers with the same sign as in Examples 11 & 12, the sign of the answer can be different. The "rules" for subtraction are, in some ways, the **opposite** of the "rules" for addition. The results of this pattern recognition are summarized below:

Operation	Signs		Sign of Answer
Addition	Same	+, + →	+
		−, − →	−
Addition	Different	+, −	+, − or 0
		−, +	

Operation	Signs		Sign of Answer
Subtraction	Same	+, +	+, − or 0
		−, −	
Subtraction	Different	+, − →	+
		−, + →	−