



# Exploring Integers

An algebra investigation by  
Bethany at  
[www.MathGeekMama.com](http://www.MathGeekMama.com)

**TOP  
SECRET**

## Teaching Tips

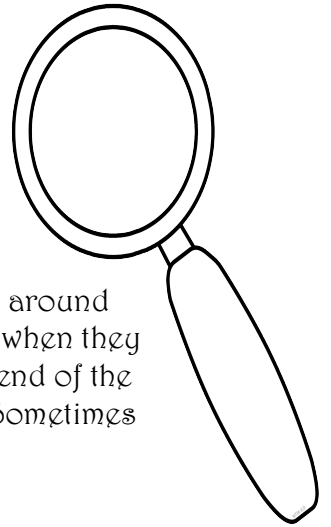
- The goal of this lesson is to help students visualize adding and subtracting integers to understand WHY you get a bigger negative when you add 2 negatives, or WHY you actually ADD when you subtract a negative, etc.
- Depending on the age of your students, you can either do one step at a time and then stop to discuss, or you can allow students to work through the entire investigation and then discuss at the end.
- It is important that once students get the hang of the credit/debit boards they understand that the positive/negative numbers that cancel out is arbitrary. It does not need to be any certain amount, because no matter how many pairs of +/- they have, they will all cancel to be 0. So if they want to make their own board to solve a problem, they simply need to have enough to complete the problem. (i.e. if the question says “subtract  $-3$ ”, they need to have at least 3 negatives so that they can “take them away.” The last question explores this idea and gets them thinking about it.
- I hope you find this lesson is helpful for your students understanding of adding and subtracting integers! 😊

**Best of Luck!**  
~Bethany

Name: \_\_\_\_\_

Date: \_\_\_\_\_

# Exploring Integers



## Before you begin:

Mrs. Smith uses a chore chart to keep track of her children's chores around the house. She uses a debit-credit system, in which they receive "+\$1" when they complete a chore, or "-\$1" when they fail to complete a chore. At the end of the week, they receive their allowance based on the work they've done. (Sometimes they are slackers and end up owing money!)

## Step 1:

Figure out the children's allowance for each week based on their debit-credit boards below.

Week 1:

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         |        |

Total: \_\_\_\_\_

Week 2:

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     |        |
| + 1     |        |
| + 1     |        |
| + 1     |        |
| + 1     |        |
| + 1     |        |

Total : \_\_\_\_\_

Week: 3

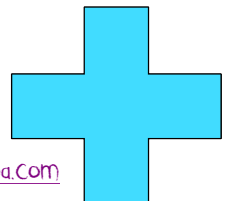
| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
|         |        |
|         |        |
|         |        |
|         |        |

Total: \_\_\_\_\_

## Explain:

1. How were you able to figure out the **total** credit/debit for each week?

2. In which week did the kids earn the **most** allowance? How do you know?



## Step 2:

Complete each of the following tables so that each table totals **-5**.

| Credits | Debits |
|---------|--------|
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |

Total: \_\_\_-5\_\_\_

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     |        |
| + 1     |        |
| + 1     |        |
|         |        |
|         |        |
|         |        |
|         |        |
|         |        |
|         |        |

Total : \_\_\_-5\_\_\_

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
|         | -1     |
|         |        |
|         |        |
|         |        |
|         |        |
|         |        |

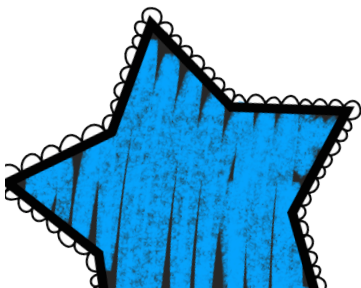
Total: \_\_\_-5\_\_\_

## Explain:

1. Describe your **strategy** for ensuring each table totaled -5.

2. Write a mathematical equation (using integers) to represent each of the tables above (remember, each equation will = -5).

3. Write **two more equations** (of your own) that equal -5.



### Step 3:

Each of the following boards shows the starting amount. Determine the NEW total after the given operation. Then write an equation to show what you did. The first one has been done for you:

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     |        |
| + 1     |        |
|         |        |
|         |        |

Start:     +2    

Take away:   +3  

New total:     -1    

Equation:   2 - (+3) = -1  

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |

Start:                     

Take away:   +4  

New Total:                     

Equation:                                     

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     |        |
| + 1     |        |
| + 1     |        |
| + 1     |        |
|         |        |
|         |        |

Start:                     

Add:   - 6  

New Total:                     

Equation:                                     

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         |        |

Start:                     

Take away:   - 3  

New total:                     

Equation:                                     

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     |        |
| + 1     |        |
| + 1     |        |
| + 1     |        |
| + 1     |        |

Start:                     

Take away:   - 2  

New Total:                     

Equation:                                     

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         |        |
|         |        |
|         |        |
|         |        |

Start:                     

Add:   - 3  

New Total:                     

Equation:                                     

### Explain:

1. How did you determine the new total after completing the given operation?

2. What do you notice when you **add a negative** number?

3. What do you notice when you **add two negative numbers** together?

4. What do you notice about **subtracting a negative number**? Why is this the case?

5. Suppose you are faced with the following problem. How might you use this strategy (a debit/credit board) to solve it?

$$6 - (-3) = \underline{\hspace{2cm}}$$

| Credits | Debits |
|---------|--------|
|         |        |
|         |        |
|         |        |
|         |        |
|         |        |
|         |        |
|         |        |

**Try it Out!**

Solve each of the following:

a.  $5 + (-3) =$

b.  $-10 - (-6) =$

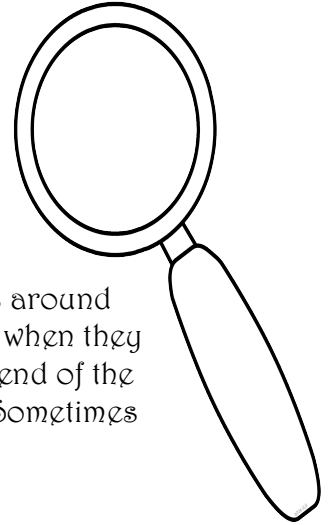
c.  $14 - (-8) =$



Name: \_\_\_\_\_ **Answer Key** \_\_\_\_\_

Date: \_\_\_\_\_

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## Before you begin:

Mrs. Smith uses a chore chart to keep track of her children's chores around the house. She uses a debit-credit system, in which they receive "+\$1" when they complete a chore, or "-\$1" when they fail to complete a chore. At the end of the week, they receive their allowance based on the work they've done. (Sometimes they are slackers and end up owing money!)

## Step 1:

Figure out the children's allowance for each week based on their debit-credit boards below.

Week 1:

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         |        |

Total: \_\_\_\_\_ **-4** \_\_\_\_\_

Week 2:

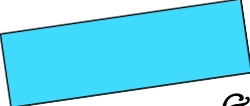
| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     |        |
| + 1     |        |
| + 1     |        |
| + 1     |        |
| + 1     |        |
| + 1     |        |

Total : \_\_\_\_\_ **+ 6** \_\_\_\_\_

Week: 3

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
|         |        |
|         |        |
|         |        |
|         |        |

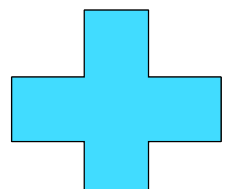
Total: \_\_\_\_\_ **0** \_\_\_\_\_



## Explain:

1. How were you able to figure out the **total** credit/debit for each week? Each +/- pair cancels out to 0, then count what is remaining (and then it is positive or negative depending on the column)

2. In which week did the kids earn the **most** allowance? How do you know? **Week 2, +6 is the largest amount of the 3 weeks.**



## Step 2:

Complete each of the following tables so that each table totals **-5**.

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |

Total: \_\_\_-5\_\_\_

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |

Total : \_\_\_-5\_\_\_

| Credits | Debits |
|---------|--------|
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
| + 1     | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |
|         | -1     |

Total: \_\_\_-5\_\_\_

## Explain:

1. Describe your **strategy** for ensuring each table totaled -5.

Add enough +/- so that all but -5 cancels out. (In the 3<sup>rd</sup> column, you could also take away 4 +1s so that there are -5 left.)

2. Write a mathematical equation (using integers) to represent each of the tables above (remember, each equation will = -5).

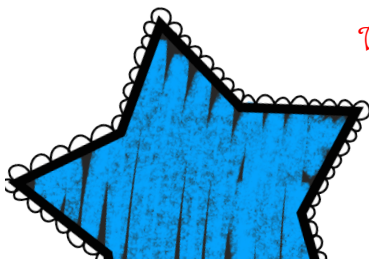
$$-11 + 6 = -5$$

$$3 + (-8) = -5$$

$$-1 + (-4) = -5 \text{ or } -1 - (4) = -5$$

3. Write two more equations (of your own) that equal -5.

Answers will vary.







3. What do you notice when you **add two negative numbers** together?  
*Adding two negative numbers gives a bigger negative*

4. What do you notice about **subtracting a negative number**? Why is this the case?

*Subtracting a negative is the same as adding, because you are removing debits (-) from the board, which leaves more credits (+) than you started with. You're taking away negatives, so you end up with more positives.*

5. Suppose you are faced with the following problem. How might you use this strategy (a debit/credit board) to solve it?

$$6 - (-3) = \underline{\quad 9 \quad}$$

*They can either solve based on what they've discovered, or use the table below.*

| Credits | Debits |
|---------|--------|
|         |        |
|         |        |
|         |        |
|         |        |
|         |        |
|         |        |
|         |        |

Try it Out!

Solve each of the following:

a.  $5 + (-3) = 2$

b.  $-10 - (-6) = -4$

c.  $14 - (-8) = 22$



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