**Lesson 16 Notes: Subtraction of Integers**

**Subtraction by Adding the Opposite Approach**

(-3) – 12

(-3) + (-12)

**Use your Rules of Addition to Simplify.**

(-3) – 12 = (-3) + (-12) = -15

**CHANGE** the sign of the second number

**CHANGE** the subtraction sign to addition

**KEEP** the sign of the first number

**Subtraction of Integers Algorithms**

**Chip Model**

1. Visual representation of the subtraction of integers
2. Use colored chips to represent integers
3. One color represents a positive integer (such as yellow) and one color represents a negative integer (such as red)
4. Equal amounts of red and yellow chips cancel each other out to equal zero.
5. 

* *Example 1:* Model the problem by drawing chips.







* *Example 2:* Model the problem by drawing chips.



* *Example 3:* Model the problem by drawing chips.

**Key:**

*Positive*

*Negative*

-8 - (-2) = -6

Eight red chips represent -8

Take two negative (-2) chips away.

You have 6 negative chips left

4 - 7 = -3

5 – (-1) = 6

I create 7 chips by adding one positive and one negative to get 0. Now, I can take 7 away. You have 3 negative chips left.

I need to take away 7 chips but I only have 4 chips.

To subtract a negative, move to the right.

-7 -6 -5 -4 -3 -2 -1 0 1 2 3 4

On the pattern on the left, the difference decreases by 1. On the pattern on the right, the difference increases by 1.

We can continue the pattern on both sides. 3 – 5 = **\_\_\_\_\_**

3 – (-1) = **\_\_\_\_\_**

**Pattern Model**

* Uses patterns of subtraction of whole number to subtract integers
* Uses Inductive Reasoning

|  |  |
| --- | --- |
| 3 – 2 = 1 | 3 – 2 = 1 |
| 3 – 3 = 0 | 3 – 1 = 2 |
| 3 – 4 = -1 | 3 – 0 = 3 |
| 3 – 5 = | 3 – (-1) = |
| 3 – 6 = | 3 – (-2) = |

To subtract a negative, move to the right.

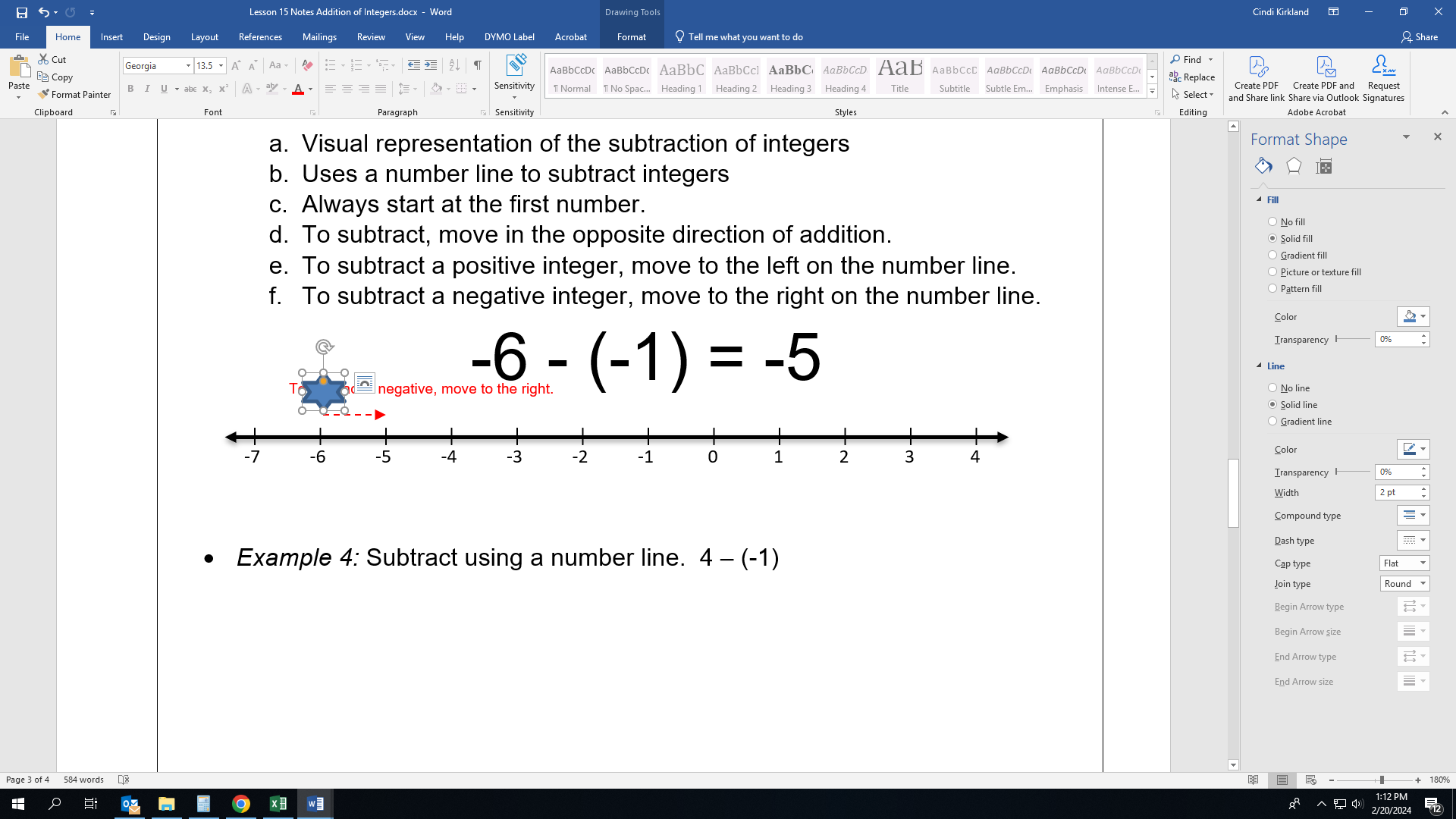
-6 - (-1) = -5

| | | | | | | | | | | |

\|

**Number Line Model**

* 1. Visual representation of the subtraction of integers
  2. Uses a number line to subtract integers
  3. Always start at the first number
  4. To subtract, move in the opposite direction of addition
  5. To subtract a positive integer, move to the left on the number line
  6. To subtract a negative integer, move to the right on the number line
* *Example 4:* Subtract using a number line. 1 – (-3) = **\_\_\_\_\_\_\_\_\_\_**



**Charged Field Model**

* 1. Visual representation of the subtraction of integers
  2. Similar to the Chip Model
  3. Use charges instead of chips
* *Example 5:* -3 – (-5) = \_\_\_\_\_\_\_\_\_\_

**Missing Addend Model**

* Subtraction of integers can be defined in terms of addition like the subtraction of whole numbers.
* Let ***a*** and ***b*** be any two whole numbers. ***a*** – ***b*** is the whole number ***c*** such that ***a*** = ***b*** + ***c***. In other words, if ***c*** is added to the subtrahend, ***b***, the sum is the minuend, ***a***. The answer, ***c***, is called the missing addend.
* We compute 3 – (-5) as follows: 3 – (-5) = n if and only if and 3 = -5 + n because 8 + -5 = 3, then n = 8
* *Example 5:* Subtract using the Missing Addend Model.
  + *-*4 – 7 = \_\_\_\_\_\_\_\_\_\_
  + *-*4 = 7 + n =\_\_\_\_\_\_\_\_\_\_

**Helpful Tips on Teaching Subtraction of Integers**

* **Think Outside the Box**
  + Use Manipulatives
    - Use tile spacers from a local hardware store
    - Make plus and minus pieces to teach students how to make “zero” when needing to subtract integers
* **Make it Fun**
  + Play Integer Battleship for a friendly subtraction competition
  + Print off a subtraction integer puzzle
* **Use Real Life Examples**
  + Money examples is a great way to teach subtraction of integers

-3 – ( - 5) = \_\_\_\_\_\_\_\_\_\_

++

-3

-3

-3 – (-5)

- - - - -

+ +

- - -

- - - - -

+ +