**Lesson 15 Notes: Addition of Integers**

Negative Integers

-3 -2 -1 0 1 2 3

Positive Integers

**Integers:**

Symbol for the set of integers:

**Opposites:**

Negative numbers are the opposite of positive numbers and vise versa.

For example, \_\_\_\_\_ and \_\_\_\_\_ are opposites.

**Rules for the Addition of Integers**

**Addition of Two Positive Integers: *4 + 5 = \_\_\_\_\_***

* *Example 1:* \_\_\_\_\_\_\_\_\_\_

**Addition of Two Negative Integers: -4 + -5 = \_\_\_\_\_**

* *Example 2:* \_\_\_\_\_\_\_\_\_\_

**Addition of a Positive Integer and a Negative Integer:**

1. **-4 + 5 = \_\_\_\_\_ b. 4 + -5 = \_\_\_\_\_**

* *Example 3a:* **-4 + 5** = **\_\_\_\_\_**
* *Example 3b:* **4 + -5 = \_\_\_\_\_**

**Addition of Integers Algorithms**

**Chip Model**

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



* 1. Determine the amount and color of the remaining chips and write the corresponding integer
* *Example 4:* Model the problem by drawing chips and then solve.

  

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**Key:**

*Positive*

*Negative*

4 + (-6)

Answer: -2

**Charged-Field Model**

* 1. Visual representation of the addition of integers
  2. Similar to the Chip Model
  3. Use charges instead of chips
* *Example 5:* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Negative so move to the left 6 units

Notice that as the “4” stays fixed, the numbers added to “4” decrease by 1 and the sum decreases by 1.

This pattern is verified when -1 is added to “4”. We can continue the pattern to continue adding integers to “4”.

**Pattern Model**

* Uses patterns of addition of whole number to add integers
* Students should be familiar with whole number addition

|  |
| --- |
| 4 + 3 = 7 |
| 4 + 2 = 6 |
| 4 + 1 = 5 |
| 4 + 0 = 4 |
| 4 + -1 = 3 |
| 4 + -2 = 2 |
| 4 + -3 = 1 |
| 4 + -4 = 0 |

Answer: -2

Positive so move to the right 4 units

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

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

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**Number Line Model**

* 1. Visual representation of the addition of integers
  2. Uses a number line to add integers
  3. Always start at 0.
  4. If the number is negative, move the arrow on the number line to the left. If the number is positive, move the arrow on the number line to the right.
  5. The distance between the two arrows is the answer.
  6. See if your distance is on the positive side of zero or the negative side of zero.
  7. Use the correct sign for your answer.



**Absolute Value**

|4| = 4 and |−4| = 4

**Properties of Integer Addition**

Given integers *a*, *b*, and *c*.

**Closure Property of Addition of Integers**

**Commutative Property of Addition of Integers**

* *Example 6:* 4 + 8 = 8 + 4 = 12
* *Example 7: Use the commutative property to complete the statement.*
  + 5 + 7 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Associative Property of Addition of Integers**

* Notice, the order of the numbers does not change. The parentheses are simply shifted. The sum remains the same.
* *Example 8:* (5 + 6) + 2 = 5 + (6 + 2) = 13
* *Example 9: Use the associative property to rewrite the sum of the following:*
  + *( 4 + 7 ) + 3 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**Identity Property of Addition of Integers**

* *Example 10:* 6 + 0 = 6

**Additive Inverse Property of Integers**

* *Example 11:* 7 + (-7) = 0 = (-7) + 7