**Unit:** Rational Numbers

**Domain:** Numbers & Operations

**Class:** 7th Grade Math

**Teacher:** Breazeale

**Week of August, 2022**

**Standard:**

**7.NS.1** Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

1. Describe situations in which opposite quantities combine to make 0.
2. Understand p + q as the number located a distance (absolute value of q) from p, in a positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (additive inverses). Interpret sums of rational numbers by describing real world contexts.

**(R-F) Essential Question:** How do mathematicians add and subtract rational numbers?

| **Day** | **Date** | **Focus Questions** | **By the end of the lesson, I can…** |
| --- | --- | --- | --- |
| **M** | **8/1** | How can mathematicians use number lines to add and subtract integers? | -Use number lines to add and subtract integers. |
| **T** | **8/2** | How do mathematicians solve real-world problems that involve adding and subtracting integers? | -Solve real-world problems that involve adding and subtracting integers. |
| **W** | **8/3** | How will I describe the steps of solving a real-world “order of operations” problem and explain how to calculate in writing? | -Describe the steps of solving a real-world “order of operations” problem and explain how to calculate in writing. |
| **R** | **8/4** | How do mathematicians add and subtract rational numbers? | -Add and subtract rational numbers. |
| **F** | **8/5** | How do mathematicians solve real-world problems that involve adding and subtracting negative numbers? | -Add and subtract rational numbers in real-world problems. |

**August 1, 2022 - Monday**

**Pre-Class: (~5 minutes) (7 minutes total)**

TSW complete practice problems.

**Anticipatory Set: (~10 minutes)**

**Introduce:** Display the lesson objective and explain.

**Hook:**  Display 4 different math expressions and have students decide which does not belong. Discuss.

**Importance/Relevance:** Turn to their workbook page 135 (Lesson 7 in RCC workbook) and gently tear out the family letter. TTW read the key parts.

**Real/World Connection:** TTW tell students to flip the page over. Discuss gaining points in sports and welcome students to jot down ideas on where they have seen combining negative and positive numbers.

**Teaching: Input (~13 minutes)**

*The teacher will…*

* Instruct students to turn to page 137. Ask for volunteers to read problems on 137 and 138 while solving the problems.

**Teaching: Guided (~10 minutes)**

*The teacher will…*

* Instruct students to turn to page 139 and have them complete the graphic organizer.

**Teaching: Independent (~5 minutes)**

*The student will…*

* Complete problems 3-5 on page 140.
* Complete practice sheet.

**Closure:** TTW select volunteers to share their responses to page 140. **(~5 minutes)**

**Assessment:** Teacher observation.

**August 2, 2022 - Tuesday**

**Lesson Duration: (50 minutes)**

**Printed Materials:** N/A

**Materials:** calculators, scratch paper/notebooks

**Technology:** Promethean Board, Projector

**Pre-Class:** Tell students to draw a circle map on their paper. They are to write EVERYTHING they know about subtracting integers. **(~5 minutes)**

**ANTICIPATORY SET: (~5 minutes)**

**Introduction:** Present the lesson goal. Review the real number system.

**Hook/Motivation Strategy:** Say, “In 200 BCE, Negative numbers appeared in the Ancient Chinese writing the Nine Chapters on the Mathematical Art. The Chinese people used a rod system for calculations with negative numbers. BLACK rods represented negative numbers and RED rods represented positive numbers. (The opposite of how we think about it today.)

These numbers and calculations were used in economic systems. The idea of negative numbers was not fully accepted, or understood beyond their use in economics.

 ![Chinese Rod Numerals [Digital image]. (2014, February 6). Retrieved May 23, 2017, from https://grahamshawcross.com/2014/02/06/five-finger-exercises/]()

**Real World Connection:** Say, “In 300 CE Greek mathematicians did not believe in negative numbers. One Alexandrian mathematician Diophantus published "[Arithmetica](http://www.mathsisgoodforyou.com/artefacts/diphantusarithmetica.htm)" in which he created an equation with a result that would be negative. He called the result "absurd."

![Mastin, L. (2010). Diophantus of Alexandria (c.200-284 CE) [Digital image]. Retrieved May 23, 2017.]()

**Real World Connection:** Say, “In 620 CE, In India, the mathematician Brahmagupta created the first set of rules when working with positive and negative numbers. He called positive numbers "fortunes" and negative numbers "debts." By this time India had a place value number system and the concept of zero.

![[Brahmagupta]. (2012). Retrieved May 23, 2017, from http://www.famous-mathematicians.com/brahmagupta/]()

**Importance/Relevance:** Say, “Now the evolution of negative numbers does not stop here. I will tell you more about the history of negative numbers tomorrow. But we can see negative integers goes way back. If you know how to [add integers](https://www.chilimath.com/lessons/introductory-algebra/addition-of-integers/), I’m sure that you can also subtract integers. The key step is to transform an integer subtraction problem into an integer addition problem.”

**Preview:** Preview what we will be doing today by showing three TikTok videos.

**Direct Instruction:**

*The teacher will…*

* Review how to add integers.
* Present notes on subtracting integers.
* TSW take notes

**Guided Practice:**

*The student will…*

* Practice adding and subtracting integers.
* The student will solve two real world problems. They will set up an equation and solve it.
* Practice adding and subtracting rational numbers.

**Independent Practice:**

*The student will…*

* Find the mistake.

**Closure: TSW complete an exit ticket.**

**Assessment:**  Teacher observation.

**August 3, 2022 - Wednesday**

**Bell Ringer:** TSW complete a practice sheet involving adding and subtracting mixed numbers with unlike denominators. Review. Give a mini-lesson on how to tell if a fraction is in simplest terms. (1) There is a “1” in the numerator. (2) The numerator and denominator are consecutive numbers. (3) Divide the numerator and denominator by the GCF. **(10 minutes)**

**ANTICIPATORY SET (5 minutes)**

**[HOOK]**& **[REAL WORLD CONNECTION]** Show the video “Why doesn’t the US use the Metric System?” at <https://youtu.be/zHSmBXOvCIY> **Discuss.**

**TEACHER INPUT: (10 minutes)**

***The teacher will…***

* Show the video at <https://www.youtube.com/watch?v=CHn_lLbnm8c>
* Present the real-world math problem to the students:
* When using Celcius, which is the metric system’s way of measuring temperature. In Celcius, 100 degrees and above is boiling, and 0 degrees and below are freezing. The Metric System is used to measure pretty much everywhere but here in the United States. In the English System (which is what Americans use) boiling is 212 degrees and above; freezing is 32 degrees. In this room it is currently 70 degrees fahrenheit. In Celcius, that would be 21 degrees fahrenheit.
* The formula to convert fahrenheit to celsius is C = (F-32) x 5 $÷$9. Parker and Angle are converting degrees fahrenheit to degrees celsius. Both are trying to convert 81 degrees fahrenheit into celsius. Parker says 81 degrees fahrenheit is 29.82 degrees celsius. Angel says 81 degrees fahrenheit is 27.22 degrees celsius. Describe in words in detail the steps it takes to convert 81 degrees fahrenheit into celsius. Conclude with which student correctly solved this problem. Then, choose a new temperature for Parker and Angel to convert. Explain how this would change the situation and the solution.(Tip: use first, next, then, and finally as transition words when writing.
* Walk students through the writing process.

**INDEPENDENT PRACTICE: (5 minutes)**

***The student will…***

* Complete the writing prompt.

**CLOSURE: (5 minutes)**

***The teacher will….***

* Review the positive things seen during this session.

**ASSESSMENT:** Teacher observation and MAAP rubric

**MATERIALS:** writing folders

**August 4, 2022 - Thursday**

**Lesson Duration: (50 minutes)**

**Printed Materials:** atoms and ions activity sheet

**Materials:** RCC workbooks, calculators

**Technology:** Promethean Board, Projector, chromebooks

**Pre-Class: (~7 minutes)**

Students will find the mistake.

**Anticipatory Set: (6 minutes)**

**Introduction:** Say, “Tuesday, I informed you negative numbers were first introduced in 200 BCE. Later on in the timeline of negative numbers--In the early 18th (or very late 17th) century— John Wallis was the first European mathematician to give negative numbers meaning. He paired negative and positive numbers with directions providing them with a meaning. If you took two steps forward you were 2 away from the start, if you took three steps backward you were -3 steps away from the start. With his interpretation of the numbers he created the number line.

**Real World Connection: Say, “**Arithmetic with negative numbers is often difficult for students to understand. Many students end up following rules or mnemonics without understanding why they exist. Modeling sums and differences of integers with a number line can help students to understand why they are doing what they are doing.

**Importance/Relevance:** Show the video “Integers Song: Adding and Subtracting with Absolute Value” at <https://www.youtube.com/watch?v=u69pYSdwugo>

**Teaching: Input (5 minutes)**

*The teacher will…*

* Explain the math stations and pass out recording sheets.

**Guided Practice:**

*The student will…*

* Complete the math stations.

**Closure:** TTW complete an exit ticket with questions from the stations. **(~5 minutes)**

**Assessment:** Teacher observation and exit ticket

**August 5, 2022 - Friday**

**Lesson Duration: (50 minutes)**

**Printed Materials:** N/A

**Materials:** RCC workbooks

**Technology:** Promethean Board, Projector

**Pre-Class: (~5 minutes)**

TSW take a 3 question bell assignment **(7.NS.1a)**. Review questio

**Anticipatory Set: (~10 minutes)**

**Introduce:** Display the lesson objective and explain.

**Hook:**  Show a video of a scuba diver.

**Real/World Connection:** Say, “In life we do not just deal with positive numbers and we do not deal with just whole numbers so we need to practice.

**Teaching: Input (Breazeale) (~18 minutes)**

*The student will…*

* Complete pages 159-164 in RCC workbook.
* TTW review.

**Closure: (~3 minute)TSW complete an exit ticket.**

**Assessment:** Teacher observation