Revised 05-23-13

ATLANTA PUBLIC SCHOOLS
Making A Difference

CCGPS Math Grade 7 Unit 1
Operations with Rational Numbers

08-07-14 to 09-20-14

(6 WEEKS)

Contents

Unit Overview

Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percentages as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems.

Connections to Previous Learning

This unit builds upon the understandings of rational numbers taught in Grade 6:

- quantities can be shown using + or – as having opposite directions or values,
- points on a number line show distance and direction,
- opposite signs of numbers indicate locations on opposite sides of 0 on the number line,
- the opposite of an opposite is the number itself,
- the absolute value of a rational number is its distance from 0 on the number line,
- the absolute value is the magnitude for a positive or negative quantity, and
- locating and comparing locations on a coordinate grid by using negative and positive numbers.

Connections to Future Learning

Learning now moves to exploring and ultimately formalizing rules for operations (addition, subtraction, multiplication and division) with integers. These rules with carry over in grade 8, where students will work with radical and integer exponents.

Content Standards

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

MCC.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.

MCC.7.NS.1.a Describe situations in which opposite quantities combine to make 0 (zero). For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.

MCC.7.NS.1.b Understand $p + q$ as the number located a distance $|q|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

MCC.7.NS.1.c Understand subtraction of rational numbers as adding the additive inverse, $p – q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

MCC.7.NS.1.d Apply properties of operations as strategies to add and subtract rational numbers.

MCC.7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

MCC.7.NS.2.a Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as(-1)(-1) = 1 $(-1)(-1) = 1$ and the rules for multiplying signed numbers.

MCC.7.NS.2.b Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

MCC.7.NS.2.c Apply properties of operations as strategies to multiply and divide rational numbers.

MCC.7.NS.2.d Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

MCC.7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Focus Standards for Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council's report *Adding It Up*: adaptive reasoning , strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately) and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy).

SMP #4: Model with mathematics

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

Essential Questions

How do mathematically proficient students approach problem solving?

SMP #8: Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations overand over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y – 2)/(x – 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x2 + x + 1)$, and $(x – 1)(x3 + x2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Essential Questions

In what ways can rational numbers be useful?

Learning Targets

I can …

- Describe real-world situations where opposite quantities have a sum of zero (SMP 4)
- Use a number line or positive/negative chips to show that an integer and its opposite will always have a sum of zero(SMP 4)
- Use a number line to show addition as a specific distance from a particular number in one direction or the other, depending on the sign of the value being added.(SMP 4)

- Interpret the addition of integers by relating the values to real world situations.(SMP 4)
- Rewrite a subtraction problem as an addition problem by using the additive inverse.(SMP 4)
- Show the distance between two integers on a number line is the absolute value of their difference. (SMP 4)
- Describe real-world situations represented by the subtraction of integers.(SMP 4)
- Use the properties of operations to add and subtract rational numbers.(SMP 4)
- Use patterns and properties to explore the multiplication of integers.(SMP 8)
- Use patterns and properties to develop procedures for multiplying integers(SMP 8)
- Describe real-world situations represented by the multiplication of integers(SMP 8)
- Use the relationship between multiplication and division to develop procedures for dividing integers.(SMP 8)
- Explain why the property of closure exists for the division of rational numbers, but not for the whole numbers.(SMP 8)
- Describe real-world situations represented by the division of integers.(SMP 8)
- Interpret the quotient in relation to the original problem.(SMP 8)
- Generalize the procedures for multiplying and dividing integers to all rational numbers.(SMP 8)
- Use long division to convert a rational number to a decimal.(SMP 8)
- Verify that a number is rational based on its decimal equivalent.(SMP 8)

Concept Overview

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize-to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents-and the ability to contextualize, to pause as needed during the manipulation process in order to probe in to the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to computer them; and knowing and flexibly using different properties of operations and objects.

Resources

http://www.insidemathematics.org/index.php/standard-4

http://www.insidemathematics.org/index.php/standard-8

Grade 7 Unit 1 Prerequisite Skills

Prior to learning the content in this unit, students must master number sense standards taught in Grade 6. Students should be able to apply and extend previous understandings of numbers to the system of rational numbers. Teachers can then use the Computer Adaptive Data to determine which students have not mastered these standards so that they can provide remediation before the unit begins. The following are grade 6 standards that are essential to student success in this unit:

- MCC.6.RP.3
- MCC.6.NS.1-8

Grade 7 U1 PreTest.docx

A. Operating with Rational Numbers

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

MCC.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.

MCC.7.NS.1.a Describe situations in which opposite quantities combine to make 0 (zero). For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.

MCC.7.NS.1.b Understand $p + q$ as the number located a distance $|q|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

MCC.7.NS.1.c Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

MCC.7.NS.1.d Apply properties of operations as strategies to add and subtract rational numbers.

MCC.7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

MCC.7.NS.2.a Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as(-1)(-1) = 1 $(-1)(-1) = 1$ and the rules for multiplying signed numbers.

MCC.7.NS.2.b Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

MCC.7.NS.2.c Apply properties of operations as strategies to multiply and divide rational numbers.

MCC.7.NS.2.d Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

MCC.7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers

Essential Questions

Why is it important to understand properties and operations involving integers and negative rational numbers?

How can number lines and diagrams be used to interpret real world problems?

Learning Targets

I can …

- Describe real-world situations where opposite quantities have a sum of zero (7.NS.1)
- Use a number line or positive/negative chips to show that an integer and its opposite will always have a sum of zero (7.NS.1)
- Use a number line to show addition as a specific distance from a particular number in one direction or the other, depending on the sign of the value being added. (7.NS.1)
- Interpret the addition of integers by relating the values to real world situations. (7.NS.1)
- Rewrite a subtraction problem as an addition problem by using the additive inverse. (7.NS.1)
- Show the distance between two integers on a number line is the absolute value of their difference. (7.NS.1)
- Describe real-world situations represented by the subtraction of integers.(7.NS.1)
- Use the properties of operations to add and subtract rational numbers. (7.NS.1)
- Use patterns and properties to explore the multiplication of integers. (7.NS.2)
- Use patterns and properties to develop procedures for multiplying integers.(7.NS.2)
- Describe real-world situations represented by the multiplication of integers (7.NS.2)
- Use the relationship between multiplication and division to develop procedures for dividing integers. (7.NS.2)
- Explain why the property of closure exists for the division of rational numbers, but not for the whole numbers. (7.NS.2)
- Describe real-world situations represented by the division of integers. (7.NS.2)
- Interpret the quotient in relation to the original problem. (7.NS.2)
- Generalize the procedures for multiplying and dividing integers to all rational numbers. (7.NS.2)

- Use long division to convert a rational number to a decimal. (7.NS.2)
- Verify that a number is rational based on its decimal equivalent. (7.NS.2)
- I can solve real-world problems that involve the addition, subtraction, multiplication, and/or division of rational numbers. (7.NS.3)

Concept Overview

Using both contextual and numerical problems, students should explore what happens when negatives and positives are combined. Number lines present a visual image for students to explore and record addition and subtraction results. Two-color counters or colored chips can be used as a physical and kinesthetic model for adding and subtracting integers. With one color designated to represent positives and a second color for negatives, addition/subtraction can be represented by placing the appropriate numbers of chips for the addends and their signs on a board. Using the notion of opposites, the board is simplified by removing pairs of opposite colored chips. The answer is the total of the remaining chips with the sign representing the appropriate color. Repeated opportunities over time will allow students to compare the results of adding and subtracting pairs of numbers, leading to the generalization of the rules. Fractional rational numbers and whole numbers should be used in computations and explorations. Students should be able to give contextual examples of integer operations, write and solve equations for real-world problems and explain how the properties of operations apply. Real-world situations could include: profit/loss, money, weight, sea level, debit/credit, football yardage, etc.

Using what students already know about positive and negative whole numbers and multiplication with its relationship to division, students should generalize rules for multiplying and dividing rational numbers. Multiply or divide the same as for positive numbers, then designate the sign according to the number of negative factors. Students should analyze and solve problems leading to the generalization of the rules for operations with integers.

For example, beginning with known facts, students predict the answers for related facts, keeping in mind that the properties of operations apply (See Tables 1, 2 and 3 below)

Table 1	Table 2	Table 3
4 x 4 = 16	4 x 4 = 16	-4 x -4 = 16
4 x 3 = 12	4 x 3 = 12	-4 x -3 = 12
4 x 2 = 8	4 x 2 = 8	-4 x -2 = 8
4 x 1 = 4	4 x 1 = 4	-4 x -1 = 4
4 x 0 = 0	4 x 0 = 0	-4 x 0 = 0
4 x -1 =	-4 x 1 =	-1 x - 4 =
4 x - 2 =	-4 x 2 =	-2 x - 4 =
4 x - 3 =	-4 x 3 =	-3 x - 4 =
4 x - 4 =	-4 x 4 =	-4 x - 4 =

Using the language of "the opposite of" helps some students understand the multiplication of negatively signed numbers (-4 x -4 = 16, the opposite of 4 groups of -4). Discussion about the tables should address the patterns in the products, the role of the signs in the products and commutatively of multiplication. Then students should be asked to answer these questions and prove their responses.

- • Is it always true that multiplying a negative factor by a positive factor results in a negative product?
- • Does a positive factor times a positive factor always result in a positive product?
- • What is the sign of the product of two negative factors?
- • When three factors are multiplied, how is the sign of the product determined?
- • How is the numerical value of the product of any two numbers found?

Students can use number lines with arrows and hops, groups of colored chips or logic to explain their reasoning. When using number lines, establishing which factor will represent the length, number and direction of the hops will facilitate understanding. Through discussion, generalization of the rules for multiplying integers would result.

Division of integers is best understood by relating division to multiplication and applying the rules. In time, students will transfer the rules to division situations. (Note: In 2b, this algebraic language $(-(p/q) = (-p)/q = p/(-q))$ is written for the

teacher's information, not as an expectation for students.) Students recognize that when division of rational numbers is represented with a fraction bar, each number can have a negative sign.

Using long division from elementary school, students understand the difference between terminating and repeating decimals. This understanding is foundational for work with rational and irrational numbers in 8th grade. For example, identify which fractions will terminate (the denominator of the fraction in reduced form only has factors of 2 and/or 5).

Ultimately, students should use the order of operations from 6th grade to solve other mathematical and real-world problems with all rational numbers.

In Grade 7 the awareness of rational and irrational numbers is initiated by observing the result of changing fractions to decimals. Students should be provided with families of fractions, such as, sevenths, ninths, thirds, etc. to convert to decimals using long division. The equivalents can be grouped and named (terminating or repeating). Students should begin to see why these patterns occur. Knowing the formal vocabulary *rational* and *irrational* is not expected.

Vocabulary

integer: An integer is a number that can be written without a fractional or decimal component. For example, 21, 4, and −2048 are integers; 9.75, 5½, and √2 are not integers. Examples{…-3, -2, -1, 0, 1, 2, 3…}

rational number: A rational number is a number that can be written as a simple fraction.

***absolute value*:** The distance between a number and zero on the number line. The symbol for absolute value is shown in this equation |-8| = 8.

***negative numbers*:** The set of numbers less than zero.

***opposite numbers*:** Two different numbers that have the same absolute value. Example: 4 and – 4 are opposite numbers because both have an absolute value of 4.

***positive numbers*:** The set of numbers greater than zero.

additive inverses: Two numbers whose sum is 0 are additive inverses of one another. Example: 3/4 and – 3/4 are additive inverses of one another because 3/4 + (– 3/4) = (– 3/4) + 3/4 = 0.

multiplicative inverse: The reciprocal of x is 1/x. In other words, a reciprocal is a fraction flipped upside down. Multiplicative inverse means the same thing as *reciprocal.* For example, the multiplicative inverse (reciprocal) of 12 is 1/12 and the multiplicative inverse (reciprocal) of 3/7 is 7/3. Note: The product of a number and its multiplicative inverse is 1. Observe that 3/5 · 5/3 = 1.

Sample Problems

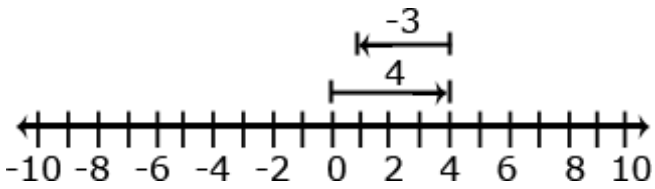
Sample Problem 1
Use a number line to add -5 + 7
Solution:
Students find -5 on the number line and move 7 in a positive direction (to the right). The stopping point of 2 is the sum of this expression. Students also add negative fractions and decimals and interpret solutions in given contexts.

Sample Problem 2

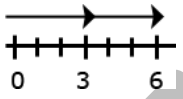
Use a number line to subtract -6 – (-4)
Solution:
This problem is asking for the distance between -6 and -4. The distance between -6 and -4 is 2 and the direction from -4 to -6 is left or negative. The answer would be -2. Note that this answer is the same as adding the opposite of -4: -6 + 4 = -2

Sample Problem 3

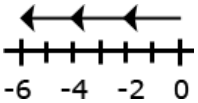
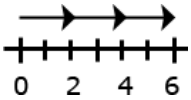
You have $4 and you need to pay a friend $3. What will you have after paying your friend? Explain how you got your answer in two different ways.
Solution: 4 + (-3) = 1 or (-3) + 4 = 1



Sample Problem 4
Examine the family of equations. What patterns do you see? Create a model and context for each of the products.

Equation	Number Line Model	Context
2 x 3 = 6		Selling two posters at $3.00 per poster
2 x -3 = -6		
-2 x 3 = -6		
-2 x -3 = 6		

Solution(s):

Equation	Number Line Model	Context
2 x 3 = 6		Selling two posters at $3.00 per poster
2 x -3 = -6		Spending 3 dollars each on 2 posters
-2 x 3 = -6		Owing 2 dollars to each of your three friends
-2 x -3 = 6		Forgiving 3 debts of $2.00 each

Sample Problem 5

Calculate: [-10(-0.9)] – [(-10) • 0.11]
Solution: 10.1

Sample Problem 6

Your cell phone bill is automatically deducting $32 from your bank account every month. How much will the deductions total for the year?
Solution: -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 = 12 (-32)

Sample Problem 7

It took a submarine 20 seconds to drop to 100 feet below sea level from the surface. What was the rate of the descent?

Solution: $\frac{-100\,\text{feet}}{20\,\text{seconds}} = \frac{-5\,\text{feet}}{1\,\text{second}} = -5\,\text{ft/sec}$

Resources, Teacher Notes, and Instructional Strategies

Standard & Topic	Resources	Teacher Notes
MCC.7.NS.1 Add and subtract rational numbers	http://www.ixl.com/math/grade-7/add-and-subtract-rational-numbers Practice adding and subtracting integers (S) http://www.youtube.com/watch?v=84w94jW6acw Video on adding and subtracting rational numbers (K, U) **Textbook Alignment** *MATH IN CONTEXT (2006)* Revisiting Numbers pp.29-31, 37-46; Operations pp.11, 14-17, 22-35 Companion workbook pp.32-54 **State Learning Task(s)** What's Your Sign.docx Learning Task-Hot Air Balloons.docx Performance Task-Debits and Cred	**Model Lesson** unit1.7.ns1c.d.doc **Student Misconceptions** Students may think... • Some students do not understand what a negative number really is and most importantly how or why it exists. An exploration lesson of negative numbers may prove beneficial. • Students do not understand negative numbers and when given a problem such as 5 – 7 and their "take-away" method may fail them. Some students have difficulty comprehending the idea of taking away more than they have. Present real-life situations so that students can understand this concept. Use manipulative devices such as counters and the number line. **Probing questions** • What number model could you use to represent the problem? • What are some ways to represent quantities? • What are some ways to visually represent the problem? • Could we have used another operation or property to solve this task? Why or why not?

		• What properties might we use to find a solution? **Differentiation Strategies** • Create a larger scaled number line on the board and ask students to help place the negative and positive whole numbers. Then display a ruler and asks, "What do the tiny marks between the whole numbers represent?" Work together using integer chips to show the first integer in each sum. Then use more integer chips to show the second integer in the sum. Work with other students to make sure each integer is shown correctly. Then find the sum of the two integers by removing pairs of opposite chips and counting the chips that remain. 1. $5 + (-7) =$ _____ 2. $-2 + 8 =$ _____ 3. $-3 + (-5) =$ _____ 4. $-1 + 8 =$ _____ 5. $7 + (-4) =$ _____ **Cooperative Learning Strategies** • The Rappin' Mathematician http://www.youtube.com/watch?v=6EWq9EZmIKg • Mr. Que Integer Rap http://www.youtube.com/watch?v=mtj95rfNBe8 **Literacy Strategies** • http://intermath.coe.uga.edu/dictnary/homepg.asp Definitions and activities for the unit and other terms can be found on the website • 4-Fold Vocabulary: This strategy allows the students to draw a graphic, write a definition, and use the word in a sentence. Afterwards, the strips can be used for a vocabulary review activity.
MCC.7.NS.2 Multiply and divide rational numbers	http://www.mathsisfun.com/algebra/rational-numbers-operations.html Notes and sample problems for operations with rational numbers (S, K, U) http://www.youtube.com/watch?v=3_ATRawpm4c Video on how to multiply and divide rational numbers (K, U) **Textbook Alignment** *MATH IN CONTEXT (2006)* Revisiting Numbers Sections C-E, pp.35-44, 46-50, 51-53, 57-59, 63-66, 68; Operations pp.38-43; Ratios and Rates pp.21-29; Building Formulas pp.37-42	**Student Misconceptions** Students may think... • Students confuse the rules for adding and subtracting negative and positive rational numbers with multiplying and dividing them. **Probing questions** • Is it always true that multiplying a negative factor by a positive factor results in a negative product? • Does a positive factor times a positive factor always result in a positive product? • What is the sign of the product of two negative

Companion workbook pp.46-48, 49-51

State Learning Task(s)

Learning Task-Multiplying Integ

Learning Task-Multiplying Ratic

Learning Task-Patterns of Mult

Learning Task-Repeater vs Ter

factors?

- How is the numerical value of the product of any two numbers found?
- In what ways does this problem connect to other mathematical concepts?

Differentiation Strategies

Students are given a set of cards with negative integers written on them. They choose two cards at random and flip a coin to determine whether the two integers are to be multiplied or divided. Students work together to find the product or quotient. When all students in the group agree on the answer, they write it down and repeat the process by choosing new integers to work with.

Answers

Answers will depend upon the numbers that are chosen.

Possible conclusion: All of the products and quotients are positive (i.e., the product or quotient of two negative numbers is positive).

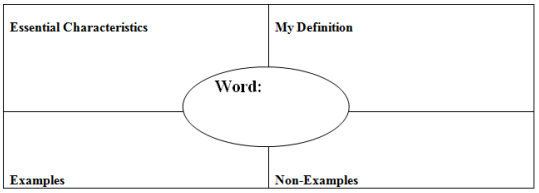
Cooperative Learning Strategies

Divide class into 4 groups: Play the integer jeopardy game at:

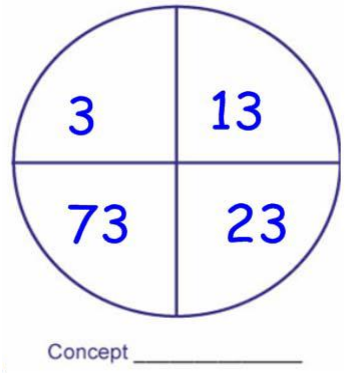
http://www.math-play.com/Integers-Jeopardy/Integers-Jeopardy.html

Literacy Strategies

FRAYER MODEL



Concept Circle:



MCC.7.NS.3

Solve real-world problems with rational numbers

http://www.slideshare.net/kscallion/operations-with-rational-numbers PowerPoint slides discussing operations with rational numbers (K)

http://quizlet.com/12787562/grade-7-unit-1-operations-with-rational-numbers-flash-cards/ Includes study games and tools (U)

State Learning Task(s)

Learning Task-Helicopters.doc

Culminating Task-Creating a Poste

Culminating Task-The Undoing of -7.docx

Model Lesson

Unit 1 Lesson.pdf

Student Misconceptions

Students may think...

- Students may have trouble interpreting the negative sign simultaneously as the minus sign. Students may also struggle with operations on negative numbers. Memorizing the rules for operations without sufficient understanding only undermines students' abilities to make sense of more advanced concepts, such as operations on polynomials. Connect problems to the real-world.
- Students are often too reliant on key words memorized from elementary school, such as 'more than.' When students look for meaning, as opposed to trying to interpret algebra as some type of code, they develop true fluency in the language of algebra.

Probing questions

- What patterns do you see?
- Write and model an equation for the situation.
- What are some of the key words in the problem? What operation do they suggest?

Differentiation Strategies

KNWS chart

K What do I KNOW from the information stated in this problem?	N What information do I NOT need in order to solve this problem?	W WHAT exactly does this problem ask me to find?	S What STRATEGY or operation will I use to solve this problem?

Cooperative Learning Strategies

Prompts/Questions

1. How do you add two integers with the same sign?
2. How do you add two integers with opposite signs?
3. What can you say about the sum of two numbers that are opposites, such as 3.5 and –3.5?
4. How do you use paper and pencil to add or subtract two decimals?

Think, Pair, Share

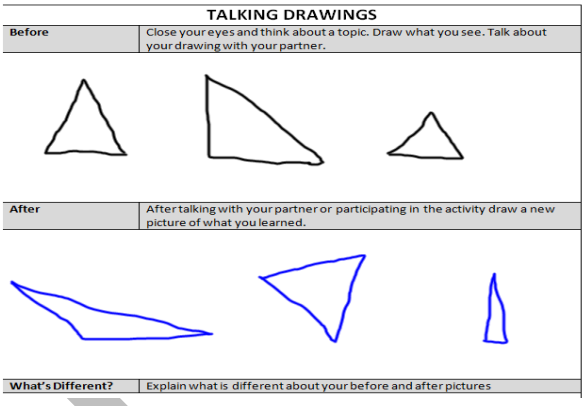
Have students jot down their own responses to questions, then discuss with a partner (who was not in their station group), and then discuss as a whole class.

Suggested Appropriate Responses

1. Add the absolute values of the integers. Use the same sign for the answer as the sign of the given integers.
2. Find the absolute value of the integers. Subtract the smaller absolute value from the greater absolute value. Use the sign of the integer with the greater absolute value.
3. The sum of the numbers is zero.
4. Write the decimals so that one is above the other and so they are aligned on the decimal point. Add zeros as placeholders if needed. Add or subtract the decimals as if they were whole numbers, placing the decimal in the answer in the same position as the decimals in the two given numbers.

Literacy Strategies:

<u>Talking Drawing</u>: enables students to communicate their thinking through drawing about a picture. An example is provided below:



TALKING DRAWINGS	
Before	Close your eyes and think about a topic. Draw what you see. Talk about your drawing with your partner.
After	After talking with your partner or participating in the activity draw a new picture of what you learned.
What's Different?	Explain what is different about your before and after pictures

Grade 7 Unit 1 Summative Assessment

MA_G7_U1 PostTest.pdf