CMS Lesson Plan

Subject: Math

Rational Explorations & their Opposites Date: 2/22/2016 – 2/26/2015

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| GSE Assessment Limits/Standards  Unit 6 – Standards  **MCC.6.NS.**5 **Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, debits/credits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.**  MCC.6.NS.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates  **MCC.6.NS.7** Understand ordering and absolute value of rational numbers.  **MCC.6.NS.7a** Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.  **MCC.6.NS.7b** Write, interpret, and explain statements of order for rational numbers in real-world contexts.  MCC.6.NS.7c Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. | Monday  Tuesday & Wednesday – Thursday & Friday  Topic: Geometry (G)  Solve real-world and mathematical problems involving rational numbers and their opposites,  Solve real world problems with absolute value |
| Lesson Objective/Learning Intention: (Objectives will vary depending upon the pace of the students)  By the end of this topic students should know:   |  | | --- | | * Understand that positive and negative numbers (integers) allow us to talk about quantities that have opposite directions or values.      * Understand that a negative integer is less than zero.      * Understand that the meaning of zero is determined by the real world context (e.g., freezing point in the Celsius system—anything below freezing is negative, anything above freezing is positive). * Apply and extend previous understandings of numbers to the system of rational numbers |  |  |  |  | | --- | --- | --- | | **MASTERY Patterns of Reasoning:** | | | | **Conceptual**:   |  | | --- | | Understand ordering of rational numbers, numbers are progressively smaller the further to the left you go on the number line.    Understand that a statement of inequality represents the relative position of the numbers on a number line. |  |  | | --- | | Understand ordering of rational numbers, numbers are progressively smaller the further to the left you go on the number line.  Understand that a statement of inequality represents the relative position of the numbers on a number line.  Understand that rational numbers found in real-world contexts can be ordered and interpreted. |  |  | | --- | | Understand absolute value of a rational number as its distance from 0 on the number line.  Understand that absolute value in a real-world context refers to the positive value of the number.  Understand that quantities may have a negative value based on context (e.g., below, debt, behind, etc.) |  |  | | --- | | Understand that as the value on a negative rational number decreases, its absolute value increases.  Understand that rational numbers can be ordered based on their magnitude. | | **Representational**:   |  | | --- | | Represent inequalities on a number line and interpret their meaning in words. |  |  | | --- | | Model and explain statements of order for rational numbers |  |  | | --- | |  | | Model absolute value with number lines and story contexts. |  |  | | --- | | Model comparisons of absolute values on a number line  Order rational numbers on a number line. |   Example:  Case 1: Two positive numbers  6 ns 7 1  5 > 3  5 is greater than 3  Case 2: One positive and one negative number  6%20ns%207%203  3 > -3  positive 3 is greater than negative 3  negative 3 is less than positive 3  Case 3: Two negative numbers  6%20ns%207%204  -3 > -5  negative 3 is greater than negative 5  negative 5 is less than negative 3 | **Procedural**:   |  | | --- | | Identify rational numbers on a number line.  Compare rational numbers using inequality symbols. |   Compare and order rational numbers in real-world contexts.  Write statements of order that reflect a real-world context.  Interpret absolute value in real-world situations.   |  | | --- | | Compare absolute values of rational numbers.  Order rational numbers by magnitude. |   Example:  One of the thermometers shows -3°C and the other shows -7°C. Which thermometer shows which temperature? Which is the colder temperature? How much colder? Write an inequality to show the relationship between the temperatures and explain how the model shows this relationship.  6 ns 7 6%20ns%207%202  Students recognize the distance from zero as the absolute value or magnitude of a rational number. Students need multiple experiences to understand the relationships between numbers, absolute value, and statements about order. |   Common models to represent and compare integers include number line models, temperature models and the profit-loss model. On a number line model, the number is represented by an arrow drawn from zero to the location of the number on the number line; the absolute value is the length of this arrow. The number line can also be viewed as a thermometer where each point of on the number line is a specific temperature. In the profit-loss model, a positive number corresponds to profit and the negative number corresponds to a loss. Each of these models is useful for examining values but can also be used in later grades when students begin to perform operations on integers.  In working with number line models, students internalize the order of the numbers; larger numbers on the right or top of the number line and smaller numbers to the left or bottom of the number line. They use the order to correctly locate integers and other rational numbers on the number line. By placing two numbers on the same number line, they are able to write inequalities and make statements about the relationships between the numbers.  Give students a rational number and have them stand in order from least to greatest on the number line.  Make flashcards of rational number and play “war.”  Have the students create statements of inequality (e.g., -9 < ½) and interpret them by writing out the inequality and its meaning in a sentence or sentences, as in “Negative 9 is less than ½ means that negative nine is to the left of ½ on the number line. Negative nine is nine and one half positions to the left of ½”).  Have a student write a real-life situation using 2 rational numbers and have another student write an inequality to represent the situation. Then switch tasks.  Have students move on a number line from 0 to 3 and 0 to -3 to show they move the same distance (i.e., walking on a number line on the floor or playground).  Have a student choose a place on the number line and have the rest of the class write the absolute value of the number.  Develop an original story problem that uses an absolute value. Justify your use of absolute value in that context.  Make integer placards for each student (be sure to include 0 in the set). Have students line up from least to greatest as integers and then as absolute values. | |
| |  | | --- | | **Academic Vocabulary and Notation** | | <, >, inequality, rational numbers, n**otation,** absolute value, decrease, increase | | **Instructional Resources and Tools** | | <http://mathforum.org/library/drmath/view/57177.html> | | **Common Misconceptions** | | Students often order rational numbers according to their absolute value. For example students often believe -40 is greater than -20 because 40 is greater than 20 | | |
| |  |  |  | | --- | --- | --- | | Assessment Tasks used | | | | **Skill-based Task:**  It is -20˚F in Juno, Alaska and -5˚F in Salt Lake City, Utah. Which city has the lowest temperature?  |-5| = If Billy owes Susie $5, express Billy’s debt as an integer.  You are $35 dollars in debt. Write your debt using mathematical symbols. How much do you need to earn to be out of debt? | **Problem Task:**  On Tuesday the temperature was -7°F and on Wednesday the temperature was -5°F. Which day was colder? Write the inequality and show it on a number line. Explain how you know your answer is correct.  A scuba diver is 30 ft. below sea level and a submarine is 75 ft. below sea level. Jim thinks the inequality for this situation should be -30 ft. below sea level > -75 ft. below sea level. Sally thinks the inequality should be -30 ft. below sea level < -75 ft. below sea level. Who is correct? Why?  A mother dolphin is 150.25 meters below sea level. Her calf is 45 meters below sea level. Which dolphin is farthest from the surface? A mother whale is at 35 meters below the surface and her calf is at the surface. How far does the calf have to swim to get to its mother? Which statement deals with absolute value? Which statement deals with ordering? Justify your answer. | Performance Task:  See required assessment task Graphing on the Coordinate Plane | | |
| Website Resources: learnzillion.com, connected.mcgraw-hill.com, Khan Academy, Inside mathematics,  Engage NY    [Cutting Up Lesson](http://www.learner.org/courses/learningmath/geometry/session5/part_b/index.html)  Geoboards (NLVM) <http://nlvm.usu.edu/en/nav/frames_asid_282_g_3_t_3.html?open=activities>  Online dot paper: [http://illuminations.nctm.org/lessons/DotPaper.pdf#search=%22dot paper%22](http://illuminations.nctm.org/lessons/DotPaper.pdf%23search=%22dot%20paper%22)  Lessons on area: <http://illuminations.nctm.org/LessonDetail.aspx?ID=L580> | |

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| Notes: Differentiation – Students will use models, hands-on, remediation where needed, small group with peers and small groups with the teacher, online resources, dot paper. |