

Lesson Title: Containing Marbles

Unit Title: Constraints with marbles

Teacher Candidate: Valerie Martinez

Subject, Grade Level, and Date: Algebra, 9-11th grade, 3/3/14

Placement of Lesson in Sequence

Students have learned how to graph and read inequalities.

Central Focus and Essential Questions

The central focus of this lesson would be for students to visualize and work with boxes of marbles to create inequalities.

Content Standards

Math.CCSS.Math.Content.HSA-CED.A.3

Learning Outcomes	Assessment
1.Creating equations/inequalities or systems of equations/inequalities 2.Solving these equations/inequalities or system of equations 3.Interpreting the answer properly	Students will be assessed on a E,M,A scale. For a student to Exceed Expectations: - Create correct inequalities, showing constraints - Present the solution using academic language - Can interpret the solution as a viable or nonviable option - Show all of the work necessary in a clear and organized way For Meets Expectations: - Mostly correct inequalities, showing constraints - Present the solution using mostly academic language - Can interpret the solution as a viable option - Shows work in a mostly clear and organized method For Approaching Expectations: - Did not complete most of the inequalities - Cannot present the solution using academic language - Cannot interpret the solution - Does not show/or do the work in a clear or organized method

Learning Targets	Student Voice
Students will be able to model the problem and provide an equation or inequality to show the possible outcomes or constraints to the solution	

Prior Content Knowledge and Pre-Assessment

Students must be able to gather the information from word problems by doing the following steps:

- Translate equalities or inequalities

- Translate operations (+, -, x, etc.)
- Translate numbers and variables

By this point, students will already know how to solve systems of equations.

Students must be able to organize their work by keeping their variables in order, sometimes (usually) this means writing what each variable stands for.

Academic Language Demands		
Vocabulary & Symbols	Language Functions	Precision, Syntax & Discourse
• Equation • Inequality • Variables • Constraints • $<, \leq, =, \neq, >, \geq$ • $+, -, \times, \div$	• Students will be using the vocabulary to explain why the equalities express the purchase. • They must be able to use the symbols to appropriately create an expression! This is not a writing activity. The answer must be written as an equality or inequality!	Mathematical Precision: Students must be able to tell the difference between an equality and inequality. If they use equals, they need to ensure it actually equals and is not less than or equal to. We need to ensure they are using the right vocabulary and symbolism. Asking questions such as “why did you use an equals sign?” or “Are we going to add marbles to this or subtract?” when errors are made.

Language Target	Language Support	Assessment of Language Target
Students will be able to explain the constraints of buying a certain amount of marbles using inequalities and academic language.	Students will be reviewing at the beginning of the period, and will be re-introduced to the vocabulary. Also, when they are presenting their work, they will be asked to use the vocabulary words provided.	Assessment of whether or not a student meets the expectations is measure with the rubric of E,M,A. See the assessment section for more information.

Lesson Rationale (Connection to previous instruction and Objective Standards)

This activity is for students to be able to model the ideas of creating inequalities from problems. They have used inequalities in an abstract way in the past, this will apply the concept to real life.

Differentiation, Cultural Responsiveness and/or Accommodation for Individual Differences

These students are in High School Algebra in a predominantly Hispanic population. Students ELL level vary from beginner to advanced, therefore by splitting into groups we ensure we are getting a varying level of ELL in each group. The students get the strip of paper with the problem, they are to answer this as a group allowing for students to learn from their peers and teach each other.

Materials – Instructional and Technological Needs (attach worksheets used)

- Marbles
- Boxes (small and large) 5 of each
- writing utensil
- paper (lined and graphing)
- ruler

Write an equality or inequality to answer the question.

Then graph the inequality.

Present their answer to the group.

Explain why the graph looks the way it does.

Group 1: If Small boxes of marbles contain 4 pieces and large boxes of marbles contain 6 pieces; if someone bought 50, write an inequality expressing this purchase.

Write an equality or inequality to answer the question.

Then graph the inequality.

Present their answer to the group.

Explain why the graph looks the way it does.

Group 2: If Small boxes of marbles contain 3 pieces and large boxes of marbles contain 7 pieces; if someone bought 45, write an inequality expressing this purchase.

Write an equality or inequality to answer the question.

Then graph the inequality.

Present their answer to the group.

Explain why the graph looks the way it does.

Group 3: If Small boxes of marbles contain 5 pieces and large boxes of marbles contain 6 pieces; if someone bought 48, write an inequality expressing this purchase.

Write an equality or inequality to answer the question.

Then graph the inequality.

Present their answer to the group.

Explain why the graph looks the way it does.

Group 4: If Small boxes of marbles contain 4 pieces and large boxes of marbles contain 7 pieces; if someone bought 40, write an inequality expressing this purchase.

Write an equality or inequality to answer the question.

Then graph the inequality.

Present their answer to the group.

Explain why the graph looks the way it does.

Group 5: If Small boxes of marbles contain 5 pieces and large boxes of marbles contain 7 pieces; if someone bought 47, write an inequality expressing this purchase.

Time	Teacher Activity	Student Activity	Purpose
5	Introduce activity: Students will need to answer the following question in their group: <i>If Small boxes of chocolates contain 12 pieces and large boxes of chocolates contain 45 pieces; if someone bought 195, write an inequality expressing this purchase.</i> Each group will have a handout with a different number, but same question. The students must write an equality or inequality to answer the question. Then graph the inequality. Present their answer to the group. Explain why the graph looks the way it does. Handout boxes and marbles (bags have 50 marbles each)	Listen Students will be asked to split into 5 groups	(number students off 1-5)
35	Assess, answer questions	Work on answering questions as a group of 3 or 4	Assess student prior content knowledge and ability to model activity
10	Assess, ask questions: "Does anyone disagree with so and so's solution?" "Why does our graph look like it does?" "what does this solution mean?"	Presenting answers	Assess student understanding