**Math modeling unit and activity**

Activity name: *Grocery Shopping with Systems*

Big Idea(s)/ Concept(s)/major math area(s): *Systems of Equations*

Grade level(s): Algebra I or Algebra II

**Math Standards included:** A1.SEI.3 (Algebra I)

Process Standards: PS.1, PS.2, PS.3, PS.4, PS.5, PS.6

**Procedure overview/ teacher directions** ........................

**Lesson details**

Expected Timing: 30 minutes

Math Vocabulary: Systems, substitution, elimination

Prior to lesson, students will have spent at least one day solving systems using graphing, substitution, and elimination.

**Part 1** Initial whole group discussion—Each group (3 or 4 students) will send 2 students to come to the teacher (cashier) to “purchase” goods. Each student will purchase a combination of the two items and receive a total cost for all the items. The students will be solving for what each item costs individually. Example: Student grabs 5 tootsie rolls and 9 jolly ranchers. I “charge” $9.50 for the 14 items. The second student grabs 7 tootsie rolls and 6 jolly ranchers. I “charge” $10 for the 13 items.

**Part 2** Once the kids have their two combinations, they will create a system of two linear equations. The groups will then solve the equations on white boards including:

* Sketch Graphically (Option to use technology)
* Elimination
* Substitution
* Explain what your solution means

**Part 3** Students will share their white boards. They will compare work and draw conclusions based on their observations and discussions. They will discuss their methods of solving and discuss which method worked best and why. Because the teacher charges the same amount for each group, point of intersection, should come out to be the same.

**Part 4** 10 minute follow up: Once we have discussed the correct answer for the system, give the students the following question: “You go to the store with $20. Write an inequality to express the possible combination of tootsie rolls and jolly rancher that you could purchase.”

**Part 5: Final discussion** Students will make connections to the point of intersection in the three different types of solving that we have discussed. During the extension, the students will be able to write an equation and interpret a graph for an inequality.

**Brief summary:** This will be an application of systems of equations to use towards the end of the systems unit. OPTION: this lesson has also been used as a discovery lesson before teaching the formal methods of solving systems of equations. At that point, students would be familiar with graphing lines and solving equations for a specified variable. The teacher has control of the difficulty of the lesson by setting the prices.