**University of Mary Division of Education**

**Instructional Sequence**

**Grade Level:** 8th grade or 9th grade

**Subject(s) Area:** Algebra I

**Materials Needed:**

* Student: the algebra text book for practice problems and homework, loose leaf paper or notebooks, pens or pencils, calculators (if they cannot do mental math), whiteboard markers, and a typical classroom whiteboard
* Teacher: a typical classroom, sticky notes, pens, the algebra book (teacher’s edition), whiteboard markers, and a typical classroom whiteboard

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**tandards:**

* The national Common Core based standard, A.REI.5, 6, 7, will be covered in this lesson of reasoning with equations, solving systems of equations (linear equations). – adapted for a student with a hearing impairment

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**bjectives:**

* The student will be able to define a system of equations.
* The student will be able to translate what the equation means by explaining out loud to the teacher.
* The student will be able to evaluate for the variables in the system of equations by practicing problems in class, and homework problems from the text book.
* *They have the prior knowledge of the definitions of equations, inequalities, and linear equations.*

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**earning Activities:**

* Start the class by asking the students, “Now that we know the definitions of linear equations, what do you think we will do with these equations?” If no one is willing to answer, encourage them to talk amongst themselves for five minutes to brainstorm ideas. write the leading question on the board
* At the end of the five minutes ask three to five students to write some of the answers on the board.
* Explain that with the knowledge of these equations, we can define a system of equations to be two equations or more equations with the same variables, x and y. write the definition of the board and remember to speak louder when facing the board
* Now explain how to solve the system of equations:
  + Start with only two equations and only two variables, x and y.
  + Explain that solving for systems of equations is how we are finding what the two equations have in common. *From review of graphing equations: what two equations have in common is the intersection point of the two lines.*
  + Illustrate an intersection by drawing an example of a graph of two lines intersecting on the board.
  + Now when the new material is introduced. We can solve systems of equations by either substitution or elimination. wear a microphone when explaining this process, or maybe stand closer to desk of the student with the hearing impairment
* Do one example by the method of substitution on the whiteboard.
  + Here is an example:

Take the two equations: x + y = 6 and -3x + y = 2.

Write it down in this manner (it makes solving easier).

1 x + y = 6

2 -3x + y = 2

Now solve for of the variables in one of the equations. Let’s choose x in the first equation.

x + y = 6, {subtract y from both sides}

x = 6 – y.

Now use this equation solved for x to substitute into the second equation,

-3x + y = 2.

Show the substitution step

-3(6 – y) + y = 2.

Now solve for y.

-3(6 – y) + y = 2, {first distribute the -3}

-18 + 3y + y = 2, {now combine like terms}

-18 + 4y = 2, {add +18 to both sides of the equation}

4y = 20, {divide by four}

y = 5.

So now we have one variable solved. We still need to still need to find the value of x.

Since we have y = 5, we can use this piece of information to find x! Pick one of the two original equations, let’s pick the first. And now substitute y = 5 into the equation to find the value of x.

x + (5) = 6, {subtract 5 from both sides}

x = 1.

So our final answer is **x = 1** and **y = 5**.

* If the students are not grasping the concept, try showing another example.
* Once they get this way to solve, solve the same example by the method of elimination.

1 x + y = 6

2 -3x + y = 2

The point of this method is to eliminate one of the variables completely and solve for the other variable left.

Steps:

1. Pick one equation, x + y = 6.
2. Now pick a number that we can multiply to this equation, so that when we add the two equations together, one of the variables will add up to zero.
   1. We pick 3.
   2. So the equation looks like this: 3( x + y) = 6 (3)
   3. Distribute the three: 3x + 3y = 18
3. Add the equation we multiplied by three to the second original equation.
   1. 3x + 3y = 18

+ -3x + y = 2

* + 1. + 4y = 20

4y = 20 {divide by 4 to both sides}

y = 5

Now use y = 5 to find the value of x. [just like how we did in the substitution method!]

1 x + y = 6

x + 5 = 6 {subtract 5 from both sides}

x = 1

Our final answer is **x = 1** and **y = 5.**

So now comparing the two methods we can see we get the same answer for x and y. So it does not matter which way the students prefer to solve system of equations. They can choose which method is easier for them.

* Ask the class which way is easier for them, substitution or elimination? speak loud enough for the student with the hearing impairment to be able to participate
* Time allowing, they can play a game.
  + Divide the class into two teams.
  + Have one member of each team come to the board.
  + Write the practice problem on the board, and have the all the students (even the ones in the desks) solve the problem.
  + Whichever of the two students at the board finishes first, gets a point.
  + Have the students take turns. make sure the student with a hearing impairment gets a turn
  + Whichever team has the most points by the end of the class period, wins and receives candy (supplied by the teacher) as their prize.
* Assign homework problems for more practice due the next day. write down the assignment on a sticky note for the student with a hearing impairment and post it to his text book

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**ssessment:**

* While the students are working on practice problems in the game, walk around to observe what the students are writing. Help the students who are stuck and do not know how to get from one step to the next.
* The students who are understanding the objectives and standards are the ones solving the systems of equations correctly. They should understand how to use their previous algebra skills to get from one step to the next.
* The best way of knowing if the students are grasping the concepts is to check their work on the homework problems once they turn them in. If certain students are not getting the correct answers, distinguish if the students is making a simple algebraic mistake, or if their process of steps does not correspond with how the lesson was taught.
* If the homework problems show that the majority of the students are not getting the correct answers, maybe spend another day in class on this lesson. Work on the homework problems that the majority of the class got wrong. Have the students ask questions of problems they want worked out, or generic questions about the system of equations.

R**eflection:**

After I present the lesson, I would ask myself these questions:

* What did I do well?
* If I were to teach this lesson again, what would I keep the same?
* If I were to teach this lesson again, what would I change?