Grade: 9th Grade	**Subject:** Algebra I
Materials: SmartBoard, Computer w/ PowerPoint, Notes, Pen, Pencil, Homework Assignment, List of Groups, Calculator	**Technology Needed:** Computer with PowerPoint, Calculator
Instructional Strategies: ☐ Direct instruction ☐ Guided practice ☐ Socratic Seminar ☐ Learning Centers ☐ Lecture ☐ Technology integration **X** Other (list) Indirect Instruction **X** Peer teaching/collaboration/ cooperative learning ☐ Visuals/Graphic organizers ☐ PBL **X** Discussion/Debate ☐ Modeling	**Guided Practices and Concrete Application:** ☐ Large group activity ☐ Independent activity **X** Pairing/collaboration ☐ Simulations/Scenarios ☐ Other (list) Explain: ☐ Hands-on ☐ Technology integration ☐ Imitation/Repeat/Mimic
Standard(s) **HS.A-REI.1 -** Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	**Differentiation** **Below Proficiency:** Below proficiency students will be paired with an above proficiency student to collaborate and work on several practice problems together. Students will be asked to explain each step. If the below proficiency student is struggling, the above proficiency student will help provide assistance. Another option will be to have students come in before or after school for some individual instruction. **Above Proficiency:** For above proficiency students, they will be given practice problems that involve functions with two variables instead of one variable. **Approaching/Emerging Proficiency:** For approaching and emerging proficiency, students will stay on pace with the lesson. They will participate in the group activity and continue with assigned problems during class time.
Objective(s) • TLW be able to solve linear functions and inequalities with one variable • TLW explain each step in solving the problem to justify their method • TLW evaluate linear functions while stating their step-by-step method **Bloom's Taxonomy Cognitive Level:** • **Understand** • **Apply** • **Evaluate**	
Classroom Management- (grouping(s), movement/transitions, etc.) • Music will play during transition into group work. Music will play for 90 seconds and signifies when students need to be grouped up and to work • Students will observe their normal classroom procedure of behavior during group work. They will be expected to be respectful and work at an acceptable noise level while paired together.	**Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules and expectations, etc.)** • Respectful and appropriate noise level when working in a group • 1, 2, then you to ask what answers students got for their questions. • Students are to be on task during group work • Calculators are to be used for math, not for playing with.

• Music will also be played when students transition back to their desks. The end of the music signifies when students need to be seated and quiet.	

Minutes	Procedures
4	**Set-up/Prep:** Students will be expected to quietly complete their bell ringer assignment when they come into the classroom. The bell ringer for today is going to be a picture of a greater than, less than, greater than or equal to, and less than or equal to symbols. Students are going to be asked to identify each symbol and what the difference is between them. This information will be relevant to class discussion at the beginning of class.
3	**Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.)** At this point I will ask the students to tell me whatever it is they know about linear functions, inequalities, or symbols related to these 2 things. We will discuss what the difference is between an equals sign and inequality sign are.
23	**Explain: (concepts, procedures, vocabulary, etc.)** First, we will discuss some key concepts: • PEMDAS. The order of operations in very important in solving linear functions and inequalities, so we will revisit PEMDAS (students will be told "Please Excuse My Dear Aunt Sally" to help them remember.) • Great than, less than, greater than or equal to, less than or equal to. Students will be presented with each symbol and asked to identify what it means. They will also be asked to write an explanation of what each of them means. a.) > _____???? Means greater than b.) $\geq$ _____????means greater than or equal to c.) < _____??????means less than d.) $\leq$_____?????????means less than or equal to • I will then have the students do a turn and talk to discuss what they think should be done to solve each equation. I will then have them come back to me and tell me what their answers are. I will be looking for simplifying, combining like terms, getting x alone, etc. Then we will talk about why each of those steps is done. a.) $14 + 6x – 8 = 6$ → What can should be the first thing done with this equation?? I'm looking for the answer of combining like terms. $6x + 6 = 6$ • I will then present them with the following question, which contains distribution. I will have them turn and talk again and discuss what they think we should do first with this problem. I am looking for the answer of distributing. I will then ask them to talk me through how we distribute. a.) $3(x – 4) = 15$ → What should we do here?? I am looking for the answer of distribute. I will then ask the students to do the distribution on their notes and share what they got with their partner. They should end up with $3x – 12 = 15$. b.) $(5 + x) 4 = 32$ → Do you think this problem is different because the number is on the right side of the parentheses? Why or why not? Once you have decided, how would you simplify this problem. I would be looking for answer that it is no different than the last equation and you distribute to simplify first. • Now we will visit how to solve a linear function with one variable. I will ask the students what the mail goal of solving a linear equation or inequality is. I would be looking for the answer of solving for the

variable. I will then have the students pair up into groups of 3 or 4 and discuss for a couple of minutes how these types of equations can be used in real-life scenarios. I will then have them come back to me and explain what their answers are.

- Through the use of questioning strategies, we will arrive at a conclusion as a class that there is a set of procedures that need to be followed to solve a linear equation or inequality. We will then explore one more concept of how to solve these problems. I will ask them that since we know we need to get the variable alone, how do we get the variable alone on one side of the equation. I will be looking for the answer of doing the opposite (or inverse) of a term to get it to the other side of the equation. I will then ask the class to turn and talk and ask exactly what that means. I will then also have them discuss what the inverse of different operations are. I will be looking for addition and subtraction are inverses as well as multiplication and division.
- Example: $4x + 7 = 19$
  a.) What should we do first and how do we do it? "the question simplified, so we should move 7 to the other side"
  b.) How do we move the 7 to the other side? "Subtract it." From what? "from the 7 on the left side and the 19 on the other side.
  c.) Good, now we have $4x = 12$. Now what do we do? "Get x alone by dividing 4"
  d.) When we divide by 4, what do we get? "$x = 3$"
- Example: $6(x – 7) = 18$ (example with distribution
  a.) What should we do to solve this problem? I would be looking for someone to say distribute. After that, I would ask what we distribute and what we end up with? I would be looking for distribute the 6 to get $6x – 42 = 18$.
  b.) At this point I would then ask what we should do? I would be looking for getting the x alone and how to do that.
  c.) I would look to get the answer of adding 42 to both sides and then dividing by 6 to get $x = 10$.

Now that we have discovered how to solve linear functions for one variable, we are going to discover that solving an inequality for one variable is essentially the same. The important thing to remember is that solving these two things are essentially the same process. Our ultimate goal is going to be to isolate the variable to get our answer. We are going to do this through the use of inverse operations to get the variable by itself as we have just done in the previous examples.

However, a very important rule needs to be discussed! There is one exception when working with inequalities. WHEN YOU ARE SOLVING THE INEQUALITY, IF YOU MULTIPLY OR DIVIDE BY A <u>NEGATIVE</u> NUMBER, what do you need to do? This is a tough question as this may have not been discussed with them before. I would be looking for you flip the inequality sign. If they cannot get that, I will discuss it with them and explain why. (i.e. if you have a greater than sign and divide by a negative, you must flip the sign to less than.)

- Let's explore a few examples
- Example: $4(x+6) > 52$
  a.) What should we do first class? I would be looking for the answer of distribute. After I get that answer, I would ask how we need to distribute. I would be looking for distributing the 4 to get $4x + 24 > 52$. Then I would ask what we do next?
  b.) At this point I would be looking for getting x alone by first subtracting 24. What do we get then? We should get $4x > 28$
  c.) What do we do next? I'm looking for the answer of dividing by 4 to get x alone and then what do we end up with?
  d.) We end up with $x > 7$

- Example: $-5(-4+3x) \leq -25$
  a.) What is our first step here class? I would be looking for the answer of simplifying by distribution. What do we distribute? Distribute the -5 into the parentheses to get $20 – 15x \leq -25$
  b.) What do we do at this step class? I would be looking for moving the 20 by subtracting. If we do that, what do we end up with? We should get $-15x \leq -45$

	c.) Now what is our next step class?? I would be looking for divide by -15, but more importantly I would be looking for SWITCH THE SIGN! d.) What do we end up with? Since we had to switch the sign, we end up with $x \geq 3$ At this point, students are going to be broken up into groups of 2. I will have the groups predetermined as I will have high proficiency students work with low proficiency students. This way they will be able to help each other.
17	**Explore: (independent, concreate practice/application with relevant learning task -connections from content to real-life experiences, reflective questions- probing or clarifying questions)** For this portion of class, we are going to be working in groups of 2. As I stated before, below proficiency students will be paired with above proficiency students. This will give each student the chance to work with another to help each other out. Each group is going to be given 10 problems, with each student responsible for answering 5 of them. They are to alternate solving problems and talking their way through solving each problem. This means explaining step by step what they are doing and why they are doing it. The other person in the group is to stop the person and correct them if they make a mistake. This way they are able to talk through the process to understand it further while also teaching each other and correcting mistakes. At the end of group work, students will be asked to go back to their seats and one student will be called upon for each question. They are to state how they solved the problem step-by-step and justify why they did each step. We will then discuss as a group whether it is correct or if there is an area that can be improved upon.
3	**Review (wrap up and transition to next activity):** At this point, I will have the students fill out an exit slip. I would have them write down 3 important things they learned about solving linear functions and inequalities for the day. The things I would be looking for include: • PEMDAS • Simplifying/Distributing • Getting the variable alone • Switching the sign when dividing or multiplying by negative number • Inverse operations to move things from one side to the other. I will review the exit slips and if needed, I will visit the topics the next day and do some more clarification. These exit slips will be used to gain an understanding of where the students are. After questions, students will be given their homework assignment and dismissed.

Formative Assessment: (linked to objectives)	**Summative Assessment (linked back to objectives)**
Progress monitoring throughout lesson- clarifying questions, check- **in strategies, etc.** • Students will be asked if they have questions during indirect instruction • I will observe students they are talking/working to see if there is any confusion	**End of lesson:** • Questions from this chapter will be included on the end of chapter test. • Questions from this unit will also be included on a homework assignment.

- I will monitor students as they are doing group work to see which students may be struggling and which ones understand
- I will use a 1, 2, then you questioning strategy to have students answer questions and get a grasp on their comprehension

Consideration for Back-up Plan:

For a back-up plan if it seems like many students are not understanding we will do one of two things. We will start from the very basics and work simple problems and work out way into more complex problems. I will make sure students have an understanding before we move on.

Another option would be to visit an outside source to help to gain understanding. We may use a video such as something from Khan Academy to give the students an outside perspective and this may help them to understand a little bit better.

If applicable- overall unit, chapter, concept, etc.:

Reflection (What went well? What did the students learn? How do you know? What changes would you make?):