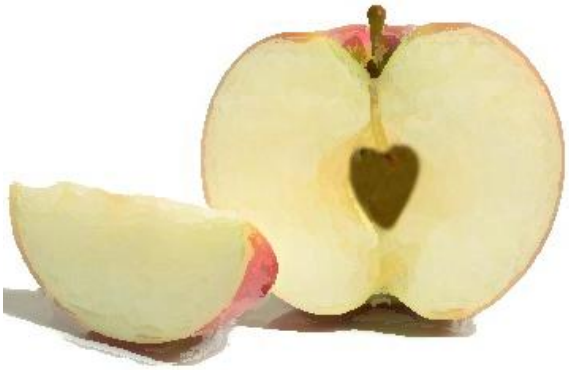

Getting to the Core

Algebra I – Unit 3

Equations & Inequalities In One Variable

Updated on May 8, 2013

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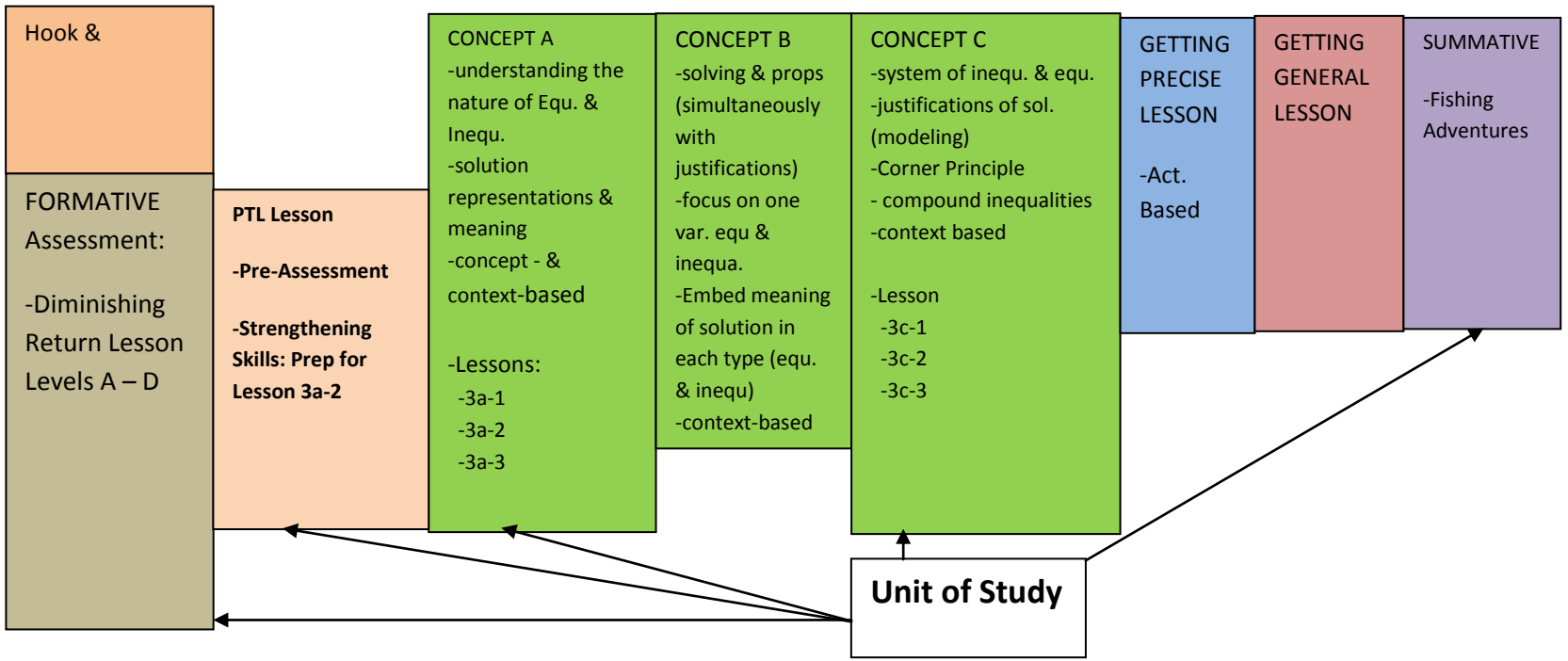
Unit 3 – Equations & Inequalities In One Variable
Table of Contents

Santa Ana Unified School District Common Core Unit Planner-Mathematics

Unit Title:	Equations & Inequalities in One Variable	
Grade Level/Course:	Algebra I/CC Course 1	**Time Frame:** 7 – 13 days
Big Idea (Enduring Understandings):	Algebraic representations are used to communicate and generalize patterns in mathematics.	
Essential Questions:	How are equations and inequalities useful? How can multiple representations be used to express relationships?	

Instructional Activities: Activities/Tasks

Units have many types of lessons that have different **purposes**



Designing for Opportunities for Standards for Mathematical Practice happen at the Unit Level
Presented by Bill McCallum, Ph.D., Algebra Forum 2012

<table>
<tr><td>21st Century Skills:</td><td colspan="3">Learning and Innovation:
☒ Critical Thinking & Problem Solving ☒ Communication & Collaboration ☒ Creativity & Innovation
Information, Media and Technology:
☐ Online Tools ☐ Software ☐ Hardware</td></tr>
<tr><td>Essential Academic Language:</td><td>Tier II:
• increments
• scale
• inverse operation
• un-do
• equation
• inequality
• inverse
• solve
• inverse
• model
• discuss</td><td colspan="2">Tier III:
• Equations (equations and inequalities)
• Simultaneous equations (in one variable)
• Solution
• Scale</td></tr>
<tr><td colspan="2">What pre-assessment will be given?
• Formative Assessment as a Hook: Diminishing Return
• Preparing the Learner Assessment: Number Sense and Number Line</td><td colspan="2">How will pre-assessment guide instruction?
• The assessment gives students opportunity to develop reasoning, critiquing, and communication skills via collaborative conversations.
• The assignment prepares students for concept development in the unit.</td></tr>
<tr><td colspan="2">Standards</td><td colspan="2">Assessment of Standards (include formative and summative)</td></tr>
<tr><td colspan="2">Common Core Learning Standards Taught and Assessed (include one or more standards for one or more of the areas below. Please write out the complete text for the standard(s) you include.)</td><td>What assessment(s) will be utilized for this unit? (include the types of both formative assessments (F) that will be used throughout the unit to inform your instruction and the summative assessments (S) that will demonstrate student mastery of the standards.)</td><td>What does the assessment tell us?</td></tr>
</table>

Common Core Mathematics Content Standard(s): **A.CED.1** Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. **A.CED.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods. **A.CED.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R. **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. **A.REI.2** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. **A.REI.11** Explain why the x-coordinates of the points where the graphs of the *equations* $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.		
Opportunities for listening, speaking, reading, writing, and thinking (*Cite Literacy Standards (as applicable):* **Bundled Speaking and Listening Standards:** 1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on topics and texts, building on others' ideas and expressing their own clearly. 4. Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.		

Standards of Mathematical Practice:	(*Check all that apply*) ☒ 1. Make sense of problems and persevere in solving them. ☐ 2. Reason abstractly and quantitatively. ☒ 3. Construct viable arguments and critique the reasoning of others. ☒ 4. Model with mathematics. ☒ 5. Use appropriate tools strategically. ☒ 6. Attend to precision. ☒ 7. Look for and make use of structure. ☒ 8. Look for and express regularity in repeated reasoning.	**Opportunities for Observable Data** *(How will students demonstrate these Mathematical Practices?)* 1. Students plan a solution pathway rather than simply jumping into a solution attempt. 3. Students make conjectures and build a logical progression of statements to explore their conjectures. 4. Students are able to identify important quantities in a practical situation and use tools such as formulas and graphs. 5. Students use concrete models, calculators when appropriate. 6. Students use clear definitions in discussion with others. 7. Students look closely to discern a pattern or structure. 8. Students notice if calculations are repeated and look for both general methods and shortcuts.
Resources/ Materials:	**Text(s) Titles:** **Mathematical Tools:** **Media/Technology:** **Supplementary Materials:**	
Interdisciplinary Connections:	**Cite several interdisciplinary or cross-content connections made in this unit of study (i.e. literature, science, social studies, art, etc.)** Science – calculating temperature in Fahrenheit and Celsius	
Differentiated Instruction:	**Based on desired student outcomes, what instructional variation will be used to address the needs of English Learners by language proficiency level?** • Explicitly teach key academic vocabulary • Monitor student responses for corrective teaching • Provide sentence starters/frames if necessary – Walqui's Clarifying Bookmarks • Allow for peers to work collaboratively	**Based on desired student outcomes, what instructional variation will be used to address the needs of students with special needs, including gifted and talented?** **Special Needs-** • Explicitly teach key academic vocabulary • Monitor student responses for corrective teaching • Use of games, peer study buddies • Provide accommodations as indicated within student IEPs: read aloud paragraphs, test questions

		and answer choices; give visual supports such as word banks, formulas, sentence starters **GATE-** • Student may take a leadership role in the group • If possible students may use technology to explore topics further

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: A3 **Lesson:** **A3-FA-1**	**Grade Level/Course:** Algebra 1/CC1	**Duration: 2 of 2 periods (50 mins.) Lesson** **Date:**
Common Core and Content Standards	**Level A:** Operations and Algebraic Thinking • Represent and solve problems involving addition and subtraction: 2.OA.1 • Represent and solve problems involving multiplication and division: 3.AO.2 & 3.OA.3 • Solve problems involving the four operations, and identify and explain patterns in arithmetic: 3.OA.8 Number and Operations in Base Ten • Use place value understanding and properties of operations to perform multi-digit arithmetic: 4.NBT.6 **Level B:** Numbers and Operations in Base Ten • Perform operations with multi-digit whole numbers and with decimals to hundredths: 5.NBT.7 Measurement and Data • Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit: 4.MD.2 Expressions and Equations • Reason about and solve one-variable equations and inequalities: 6.EE.6 • Solve real-life and mathematical problems using numerical and algebraic expressions and equations: 7.EE.3 **Level C:** Ratios and Proportional Relationships • Understand ratio concepts and use ratio reasoning to sovle problems: 6.RP.3 Expressions and Equations • Reason about and solve one-variable equatiosn and inequalities: 6.EE.6 & 6.EE.7 • Solve real-life and mathematical problems using numerical and algebraic expression and equations: 7.EE.4 **Level D:** Number and Operations – Fractions • Use equivalent fractions as a strategy to add and subtract fractions: 5.NF.2 • Apply and extend previous understandings of multiplication and division to multiply and divide fractions: 5.NF.4 Expressions and Equations • Reason about and solve one-variable equatiosn and inequalities: 6.EE.6 & 6.EE.7 • Solve real-life and mathematical problems using numerical and algebraic expression and equations: 7.EE.4 The Number System	

	• Apply and extend previous understandings of operations with fractions to add, subtract rational numbers, represent addition and subtraction on a horizontal or vertical number line diagram: 7.NS.1, 7.NS.2, 7.NS.3 High School – Algebra – Creating Equations • Create equations that describe numbers or relationships: A.CE.1 High School – Algebra – Reasoning with Equations and Inequalities • Solve equations and inequalities in one variable: A-REI.3 and A-REI.4	
Materials/ Resources/ Lesson Preparation	Handouts: Problem of the Month: Diminishing Return Levels A – D	
Objectives	**Content:** Students are to display their understanding of Level A is designed to be accessible to all students and especially the key challenge for grades K-1. Level B may be the limit of where fourth and fifth grade students have success and understanding. Level C may stretch sixth and seventh grade students. Level D may challenge most eighth and ninth grade students.	**Language:** Students will use appropriate language to justify their solutions in solving non-routine problems.
Depth of Knowledge Level	☐ **Level 1: Recall** ☒ **Level 2: Skill/Concept** ☒ **Level 3: Strategic Thinking** ☒ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☒ **1. Make sense of problems and persevere in solving them.** ☒ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☒ **4. Model with mathematics.** ☐ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☐ **7. Look for and make use of structure.** ☐ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** ☒ **Coherence within and across grade levels** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	
bul ary (Ti PROVI DESSI MPLE EXPL	**KEY WORDS ESSENTIAL TO**	**WORDS WORTH KNOWING**

		UNDERSTANDING	
			Tokens Mow
	STUDENTS FIGURE OUT THE MEANING		Twice
Pre-teaching Considerations			

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☒ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☐ **Independent Practice** ☐ **Guided Inquiry** ☐ **Reflection**
	Prior Knowledge, Context, and Motivation: **See Common Core Content Standards for details.**

Lesson Continuum

Body of the Lesson:

Activities/ Questioning/ Tasks/ Strategies/ Technology/

Engagement

Lesson Overview

Formative Assessment: Diminishing Return Levels A – D

Preparing the Learner Lesson: Focus on Collaboration and strategies needed throughout the unit.

Day 1 of 2:

Teacher: Pass out Problem of the Month packet: Diminishing Return Levels A-D to use as a formative assessment. Have students work either in pairs or groups of four. Let students know that the reasoning must be in place for each level.

Students are to collaboratively work on these problems using the following Dyad Share structure to discuss the reasoning. Students can be given the following frames to have conversations with their partner: I agree/disagree with _____ because _____.

Dyad Share Structure:

Agree/Support	Disagree/Contest	Extend/Expound
1. _____ 2. _____ 3. _____	1. _____ 2. _____ 3. _____	1. _____ 2. _____ 3._____

Teacher: may find that students will start having trouble understanding and

Differentiated Instruction:

English Learners:

Students should be paired up with others.

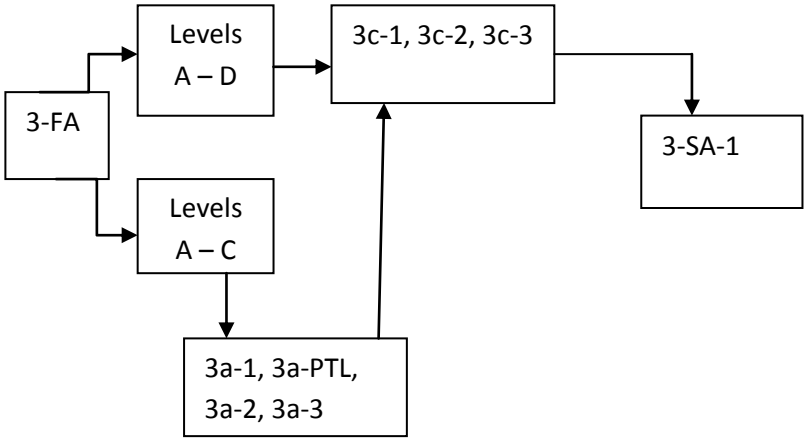
Provide linguistic frames to assist students with their discussions/explanations.

Students Who Need Additional Support:

Students should be paired up with others.

Provide linguistic frames to assist students with their discussions/explanations.

	solving problems at Level C. Teacher may help facilitate the learning by asking leading questions **Suggested Questions:** 1. How many ways are there can this problem be solve? Which ones? What makes you think so? 2. Can you use information from the previous Level to help guide the thinking at this level? How? What is it? 3. If creating a table with time and the matching "job" done for each person, how does that table lay out? What information can you get? Does that help solve the problem? In what way? 4. Besides the table, since it's very time consuming, is there another way to approach this problem? What would that be? How many variables do we have in this problem? How many equations? What do they look like? Can we use the information from the table to help with this "shortcut"? **Teacher:** Please see the solution set attached below for Levels A-D. **Day 2 of 2:** **Teacher:** Once all students are done with their work, have each group display their "most proud of" solved problem/level on chart paper for a Gallery Walk. See Gallery Walk structure below for more information. **Gallery Walk Structure:** • Each group will display their poster • Each group selects a group member to be the docent to answer questions or provide clarifications/explanations • The other group members examines, explores, reviews the other groups' posters • There will be time for each group to re-assemble and discuss the information shared in the groups' posters • Please remind gallery walk norms and be respectful of the work and information shared. **Teacher:** Please assign tasks for the rest of the team to pay attention to while performing the walk. Assign a purpose for each observant. Prompts: Student 1: What is a method that is found common across teams? Student 2: What is a unique method that is very different from the rest of the team? Student 3: Pick one method/poster that gives a different answer from yours. Evaluate that method in comparison to yours. ## Formative Assessment Action Point: **Teacher:** If students answer correctly Levels A – C, this group of students are to start from Lesson 3a-1 throughout the entire unit. **Teacher:** If students answer correctly Levels A – D, this group of students are ready to start from Lesson 3c-1 throughout the entire unit. **Teacher:** It depends on your students' ability to solve these levels for the decision of where to start this unit of study. **See flow map below for summary of decision making points.**	**Accelerated Learners:** Accelerated Learners are more likely achieve Level D. Have this group display and explain the solution for this work.



Lesson Reflection	
Teacher Reflection **Evidenced by Student Learning/ Outcomes**	

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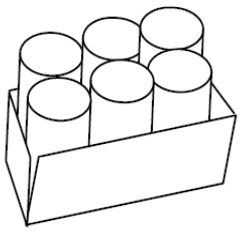
Diminishing Return

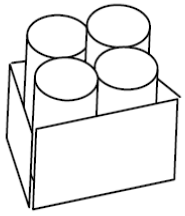
Level A:

Some classes are going out for a picnic lunch. The teachers bought drinks in packs for their classes.

Thirty-three students are in Mrs. Browne's class. Mrs. Browne bought six-packs for her class. She needs helpers, so she picks students to carry one six-pack each.



Twenty-two students are in Mrs. Robinson's class. Mrs. Robinson bought four-packs for her class. She needs helpers, so she picks students to carry one four-pack each.



Which teacher had to pick more helpers?

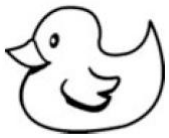
Show how you found your answer.

Level B:

Amusement Center Store


Yo Yo $1.22


Doll $2.75


Duckie $1.85


Tractor $5.97


Airplane $6.47

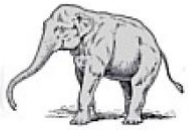

Ball $2.16


Racecar $7.13


Dog $4.57

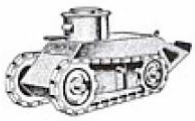

Jump Rope $1.46


Car $5.18




Bear $4.89


Xylophone $7.11


Tank $6.45


Checkers $4.77


Boat $8.04 Train $6.71 Jacks $2.31 Truck $6.21 Whistle 98¢ Pinwheel 87¢

Mia has earned $43.94 of tokens playing games at the amusement center. The store in the amusement center has the following toys for sale. She plans to get toys and donate them to a local charity for needy children. The tokens are only good in this store, so she plans to spend all the tokens. What combinations of toys can she buy in order to spend all the tokens?

Show how you found your solution.

Is your solution the only possible answer? Explain.

Level C:

Maxine and Sammie have the same size lawn. Maxine can mow the lawn in 24 minutes and Sammie can mow the lawn in 36 minutes. At what time will Sammie have twice as much lawn to mow as Maxine?

Maxine and Sammie have to also mow their parking strips that are the same size. Maxine can mow the parking strip in 6 minutes and Sammie can mow the parking strip in 9 minutes. At what time will Sammie have twice as much grass to mow as Maxine?

Level D:

Rollie was successful in losing weight. He had a goal weight in mind. He went on a diet for three months. Each month, he would lose one-third of the difference between his current weight and his goal weight and an additional three pounds. At the end of three months, he was just 3 pounds over his goal weight. How many pounds did he lose in those three months?

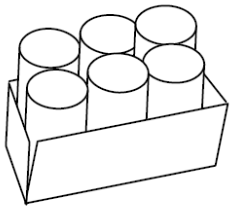
Explain how you arrived at your solution.

Diminishing Return Solution

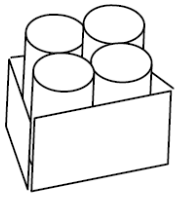
Level A:

Some classes are going out for a picnic lunch. The teacher bought drinks in packs for their classes.

Thirty-three students are in Mrs. Browne's class. Mrs. Browne bought six-packs for her class. She needs helpers, so she picks students to carry one six-pack each.



Twenty-two students are in Mrs. Robinson's class. Mrs. Robinson bought four-packs for her class. She needs helpers, so she picks students to carry one four-pack each.



Which teacher had to pick more helpers?
Both teachers would need to use 6 helpers, so they would need to pick the same number

Show how you found your answer.

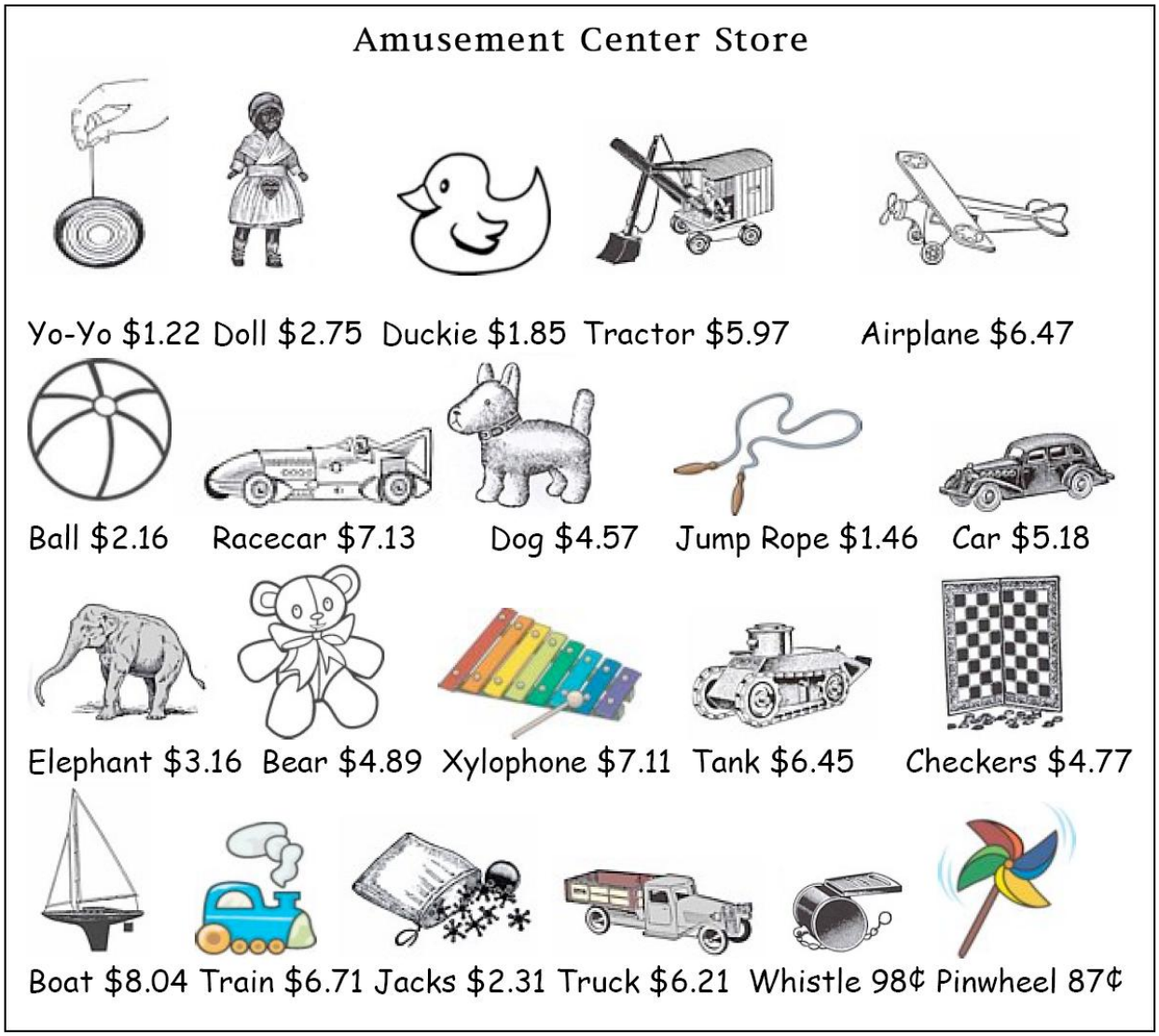
Student may use several strategies including repeated addition:
6+6+6+6+6+3 = 33 so it would take 6 helpers
4+4+4+4+4+2 = 22 so it would take 6 helpers

or students may use repeated subtraction
33 – 6 - 6 – 6 – 6 – 3 = 0 so it would take 6 helpers
22 – 4 – 4 -4 – 4 – 4 – 2 = 0 so it would take 6 helpers

or students may use multiplication and addition
6 x 5 = 30, 30 + 3 = 33 so 6 helpers total
4 x 5 = 20, 20 + 2 = 22 so 6 helpers total

or students may use division and adjust for the remainders
33 ÷ 6 = 5 helpers plus 3 more drinks or a total of 6 helpers
22 ÷ 4 = 5 four-packs plus 2 more drinks or a total of 6 helpers

Level B:



Mia has earned $43.94 of tokens playing games at the amusement center. The store in the amusement center has the following toys for sale. She plans to get toys and donate them to a local charity for needy children. The tokens are only good in this store, so she plans to spend all the tokens. What combinations of toys can she buy in order to spend all the tokens?

Train, boat, tractor, truck, racecar, jacks, yo-yo, jump rope, bear

Show how you found your solution.

One method would be to make a table (next page). The table arranges the toys in order from least to most expensive. In addition, columns were constructed which compared consecutive differences. Using this tool and a guess and check method one can first

estimate a sum closest to the target amount and then make adjustment knowing the differences in prices between the toys.

Is your solution the only possible answer? Explain.

There are multiple possible answers. The chart makes it fairly straightforward to find a different list. For example, the tank cost 24¢ more than the truck. The whistle cost 24¢ less than the yo-yo. Therefore I could substitute the tank for the truck (making the values 24 cent more than the target), but then compensating by substituting the whistle for the yo-yo. Therefore, I would have a new list whose overall price would also be $43.94.

Train, boat, tractor, tank, racecar, jacks, whistle, jump rope, bear

			Toy	Price	Consecutive Difference	Diff by 2
Train	6.71		Pinwheel	0.87		
Boat	8.04		Whistle	0.98	0.11	
Tractor	5.97		Yo-Yo	1.22	0.24	0.35
Truck	6.21		Jump Rope	1.46	0.24	0.48
Racecar	7.13		Duckie	1.85	0.39	0.63
Jacks	2.31		Ball	2.16	0.31	0.7
Yo-Yo	1.22		Jacks	2.31	0.15	0.46
Jump Rope	1.46		Doll	2.75	0.44	0.59
Bear	4.89		Elephant	3.16	0.41	0.85
			Dog	4.57	1.41	1.82
Total	43.94		Checkers	4.77	0.2	1.61
			Bear	4.89	0.12	0.32
			Car	5.18	0.29	0.41
			Tractor	5.97	0.79	1.08
			Truck	6.21	0.24	1.03
			Tank	6.45	0.24	0.48
			Airplane	6.47	0.02	0.26
			Train	6.71	0.24	0.26
			Xylophone	7.11	0.4	0.64
			Racecar	7.13	0.02	0.42
			Boat	8.04	0.91	0.93

Level C:

Maxine and Sammie have the same size lawns. Maxine can mow the lawn in 24 minutes and Sammie can mow the lawn in 36 minutes. At what time will Sammie have twice as much lawn to mow as Maxine?

18 minutes

The problem may be solved many ways using the knowledge of rates and that Rate • Time = Amount Mowed. It can be solved using a table.

	Maxine's	Maxine's	Sammie's	Sammie's
Minutes	Lawn Mowed	Lawn Left	Lawn Mowed	Lawn Left
0	0	1	0	1
1	0.04	0.96	0.03	0.97
2	0.08	0.92	0.06	0.94
3	0.13	0.88	0.08	0.92
4	0.17	0.83	0.11	0.89
5	0.21	0.79	0.14	0.86
6	0.25	0.75	0.17	0.83
7	0.29	0.71	0.19	0.81
8	0.33	0.67	0.22	0.78
9	0.38	0.63	0.25	0.75
10	0.42	0.58	0.28	0.72
11	0.46	0.54	0.31	0.69
12	0.50	0.50	0.33	0.67
13	0.54	0.46	0.36	0.64
14	0.58	0.42	0.39	0.61
15	0.63	0.38	0.42	0.58
16	0.67	0.33	0.44	0.56
17	0.71	0.29	0.47	0.53
18	0.75	**0.25**	0.50	**0.50**
19	0.79	0.21	0.53	0.47
20	0.83	0.17	0.56	0.44
21	0.88	0.13	0.58	0.42
22	0.92	0.08	0.61	0.39
23	0.96	0.04	0.64	0.36
24	1.00	0.00	0.67	0.33
25			0.69	0.31
26			0.72	0.28
27			0.75	0.25
28			0.78	0.22
29			0.81	0.19
30			0.83	0.17
31			0.86	0.14

32			0.89	0.11
33			0.92	0.08
34			0.94	0.06
35			0.97	0.03
36			1.00	0.00

It can be solved algebraically. Since each minute, Maxine mows 1/24th of the lawn and Sammie mows 1/36th. Those are rates, lawn mowed per minutes, therefore the amount of the lawn remaining is 1 – rate times the minutes past. So the question is, when will Sammie have twice as much lawn left as Maxine? Therefore an algebraic equation for the situation is:

$2[1 - (1/24 \bullet T)] = (1 - (1/36 \bullet T))$

solving for T:
$2 - T/12 = 1 - T/36$
$1 = 2T/36$
$T = 18$

Maxine and Sammie have to also mow their parking strips that are the same size. Maxine can mow the parking strip in 6 minutes, and Sammie can mow the parking strip in 9 minutes. At what time will Sammie have twice as much grass to mow as Maxine?

4.5 minutes
Similar approaches may be used

Level D:

Rollie was successful in losing weight. He had a goal weight in mind. He went on a diet for three months. Each month he would lose one-third of the difference between his current weight and his goal weight and an additional three pounds. At the end of three months he was just 3 pounds over his goal weight. How many pounds did he lose in those three months?

Explain how you arrived at your solution.

Using Guess and Check

	Current weight over the goal weight	1/3 of difference between current and goal weight	Plus 3 lbs is the lbs lost that month
Start	31.5	10.5	13.5
End Month 1	18	6	9
End Month 2	9	3	6
End Month 3	3		

Using Algebra

Let x be the difference between original weight to goal weight or lbs to lose.

End of 1st Month = $x - (1/3\ x + 3) = 2/3\ x - 3$
New current weight to lose = $2/3\ x - 3$

End of 2nd Month = $(2/3\ x - 3) - (1/3\ (2/3\ x - 3) + 3) = 4/9\ x - 5$
New current weight to lose = $4/9\ x - 5$

End of 3rd Month = $(4/9\ x - 5) - (1/3\ (4/9\ x - 5) + 3) = 8/27\ x - 171/27$
Final weight to lose = $8/27\ x - 171/27$

So the final weight of $3 = 8/27\ x - 171/27$, therefore $x = 31.5$

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

<table>
<tr><td>Unit: 3

Lesson: 3a-1</td><td colspan="2">Grade Level/Course:

Algebra 1/CC Course 1</td><td>Duration: 1 of 1 (50-Minute) Period

Date:</td></tr>
<tr><td>Common Core and Content Standards</td><td colspan="3">A.CED.1

Create linear equations and inequalities in one variable and use them in a contextual situation to solve problems.</td></tr>
<tr><td>Materials/ Resources/ Lesson Preparation</td><td colspan="3">Handout 3a-1: Understanding Inequalities (one per student)</td></tr>
<tr><td>Objectives</td><td colspan="2">Content:

Students will be able to create equations and inequalities from a given context</td><td>Language:

Students will use appropriate academic language about equations and inequalities when speaking and writing about the topic.</td></tr>
<tr><td>Depth of Knowledge Level</td><td colspan="3">☒Level 1: Recall ☒Level 2: Skill/Concept

☒ Level 3: Strategic Thinking ☐ Level 4: Extended Thinking</td></tr>
<tr><td>Standards for Mathematical Practice</td><td colspan="3">☒ 1. Make sense of problems and persevere in solving them.
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☐ 5. Use appropriate tools strategically
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<tr><td>Common Core Instructional Shifts in Mathematics</td><td colspan="3">☒ Focus on the Standards
☒ Coherence within and across grade levels
☒ Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)</td></tr>
<tr><td rowspan="2">Academic Vocabulary
(Tier II & Tier III)
PROVIDES TEACHER SIMPLE EXPLANATION</td><td colspan="2">KEY WORDS ESSENTIAL TO UNDERSTANDING</td><td>WORDS WORTH KNOWING</td></tr>
<tr><td colspan="2">is equal to

is less than

is greater than

is less than or equal to

is greater than or equal to</td><td>Equal symbol

Inequality symbol</td></tr>
</table>

	STUDENTS FIGURE OUT THE MEANING		
Pre-teaching Considerations	This lesson requires students to be able to communicate their understanding of equations and inequalities with their groups.		
Lesson Delivery			
Instructional Methods	**Check method(s) used in the lesson:** ☒ **Modeling** ☒ **Guided Practice** ☒ **Collaboration** ☒ **Independent Practice** ☒ **Guided Inquiry** ☒ **Reflection**		
	Prior Knowledge, Context, and Motivation: **Prior Knowledge:** Students know how to translate words into equations. **Context:** Students will work through real life application. **Motivation:**		
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**Lesson Overview** **Day 1 of 1** **Lesson 3a-1 Understanding Inequalities** • **Independent Group Effort: Reading Comprehension & Collaboration** • **Mathematical Practice(s) Being Monitored:** 3: Construct viable arguments and critique the reasoning of others Objective: Students will analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of other students. **Part 1. Small Group Discussion**	**Differentiated Instruction:** **English Learners:** -Gallery Walk Structure -Close Read strategy	

Lesson Continuum

Teacher: Have students work on **3a-1 handout** in groups of 4 for 10 minutes. They should work collaboratively on Questions 1 – 4.

Teacher: See below for details on possible structure for students to work collaboratively by assigning each student in a group a role. **Group roles:** Choose 1 of the 3 options below in order to assign group roles.

Option 1:

1. **Resource Manager**
   - Get resources for the team
   - The teacher may give you extra information to share with the team.
   - Call the teacher over for team questions
2. **Facilitator**
   - Help your team get started by having someone read the task.
   - Make sure everyone understands your team's answer before you move on.
3. **Recorder/Reporter**
   - Be prepared to show team's ideas with the class.
   - Make sure your team agrees about how to share your work
4. **Task manager**
   - Make sure no one talks outside your team.
   - Help keep your team on-task and talking about math
   - Listen for statements and reasons.

Option 2:

5. **Sergeant of Arms**
   - Norm monitor and quality control
   - Keeps each team member on task so that we can do our best work
   - Complete the task on the timely manner
   - Time keeper to ensure the team has ample time to answer all assigned questions
6. **Supply General**
   - Get the supplies for the rest of the team
   - Leads the team to action
   - Oversees different members' roles
   - Empowers, monitors, and maintains responsibilities of each member
7. **Recorder**
   - Serve as the Secretary who records the thoughts and hypotheses of the group members
   - Make sure <u>all</u> members contribute to discussion (including yourself)
8. **Reader/Interpreter**
   - Reads the question and interprets what the group is asked to do for each question
   - Determines and defines key vocabulary for all members
   - Ensures every team member has the same understanding

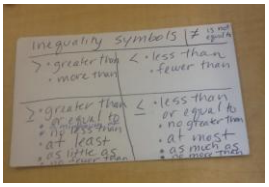
Students: Participate in a discussion with their group members. Each student will have a particular role in the group. Each student must select a role. Every student is responsible to fulfill their duties. Every group member must contribute to the discussion.

Teacher: As a facilitator, circulate to every group and provide support. By asking the suggested questions below. As you work with each group, select a student role and ask them for the group's finding for each problem.

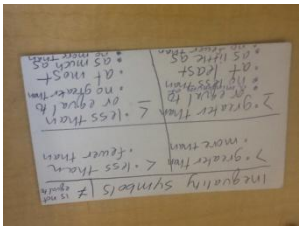
Students Who Need Additional Support:
Teacher, paraprofessional or peer study buddy: Read questions aloud

Teacher: Provide individual cards (best) or handout with role names and descriptions. Provide vocabulary card with inequality symbols and words used for each.

Example:



If preferred, have students make their own reference card, adding words to each symbol as they are discovered during the lesson.



Accelerated Learners:

Suggested set of guided questions:

1. What are possible amounts?
2. Are these the only possibilities?
3. What does "at least" mean?
4. What does "at least ten" mean? Can there be more? Can there be less?
5. What does "more than" mean? Can there be less?

Option 3:

Teacher: Have students work in pairs to complete the questions on the first page. Then students will compare their answers and discuss their approaches in groups of 4.

Students: Work in pairs and compare their answers. They are to ask each other the following suggested questions to help carry out the conversation:

- How do you know when to use which symbols?
- How do we check our answers when ours answers don't match?
- Can you show me how you go about selecting the symbols?

Large group discussion

Teacher: Bring the class together as a whole to discuss findings. Have a representative from each group share their findings with the class. Select one role (ex. Sergeant of Arms) to switch with the group next to them. Make sure that every group has a new member.

Student: The student that moves to the next group must record their finding. If they have a different answer, then they must record it on their paper and write down their reasoning (why it was incorrect or correct). The student must go back to their original team and report their findings.

Part 2: Close Read

Teacher: Have students read closely Part 2 to draw understanding of the symbols used when writing inequalities. While students are reading, be a facilitator while circulating around from group to group to provide clarification.

Students: The Reader will read the information given in Part 2 as the rest of the group follows along.. The Interpreter will state the key vocabulary and the notation to be used. The Supply General will draw meaning from the verbal expression to the symbols. The Sergeant of Arms will review the example given and ask group if they have any questions.

Part 3: Text dependent questions

Teacher: Have students use the information in Part 2 to write the inequalities from Part 1.

Student: Each student will be responsible for writing the inequality using the given symbols. The Sergeant of Arms will decide what each person will be working on (Part 1#1-4). They will then share with their group and decide whether they agree or disagree.

Part 4: Let's practice

	Option 1: Gallery Walk **Teacher:** Assign each group a problem. Allow students to work on the problem that you assigned. They must work as a team to create the poster. Students must show all of their work on the handout first and decide as a group if they agree **Student:** Students will be working on as a team. They must have all components of the activity: problem, equation/inequality, and the verbal expression. When students are done, they must decide if they all agree that all components of the problem are accurate. When they agree, as a group, then they will be creating a poster. Every person must contribute to the project. **Gallery Walk Structure:** • Each group will display their poster • Each group selects a group member to be the docent to answer questions or provide clarifications/explanations • The other group members examines, explores, reviews the other groups' posters • There will be time for each group to re-assemble and discuss the information shared in the groups' posters • Please remind students of the gallery walk norms and be respectful of the work and information shared. **Teacher:** Please assign tasks for the rest of the team to pay attention to while performing the walk. Assign a purpose for each observant. Prompts: Student 1: What is a method that is found common across teams? Student 2: What is a unique method that is very different from the rest of the team? Student 3: Pick one method/poster that gives a different answer from yours. Evaluate that method in comparison to yours. **Option 2:** **Teacher:** Allow students to work independently through all of the problems for 20 minutes. Allow students to discuss their work. They need to compare and give their reasoning for their answers. **Students:** They will be working independently for 20 minutes. They will be working on the eight problems. **Closure-Today's Main Idea** **Think/Write/Pair Share:** Every student will think about today's lesson and write their thought (or what they learned today). They will then discuss with their group.	
Lesson Reflection		
Teacher Reflection **Evidenced by Student Learning/ Outcomes**		

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3a-1 Understanding inequalities

1. Javier has enough to pay for his lunch at the amusement park. Lunch costs $10. What are the possible amounts that he may have? Explain your answer.

_____

_____

2. Ms. G wants to take her Avid class to Knott's for their end of the year field trip. It will only happen if more than 20 students pass the math test. How many students need to pass?

_____

_____

3. There has to be at least 20 students but no more than 60 on the bus. How many students can fill one bus? Explain your answer.

_____

_____

4. Each log on the log ride fits no more than five people. If you have less than five people, then the ride will not go. How many riders must be on log? Explain your answer.

_____

_____

Given

= "is equal to"
> "is greater than"
< "is less than"
≤ "is less than or equal to"
≥ "is greater than or equal to"

The **equal symbol** is used to show that two quantities are the same.

The **inequality symbols** are used to represent two quantities that are not necessarily equal.

For example, the inequality

$$x > 5$$

could be used to represent the sentence "John has more than $5"

Use the given symbols above and write mathematical representations for problems 1 – 4.

1. _____
2. _____
3. _____
4. _____

Let's practice!

Problem	Equation/Inequality *ex.* $x > 8$	Verbal expression *ex. "x is is greater than 8"*
There are a total of 80 students going to Knott's.		
Maritza has less than $18 for lunch and amusement.		
John wants to buy a souvenir for himself. The souvenirs cost $6 or more but less than $30.		
You must be at least 48" to ride most rides.		
Eric is having a birthday party and wants to give out party favors. He has $80 to spend on party favors.		
	$n \geq 20$	
		x is less than or equal to 50.
	$x < 10$	

Today's main idea (share your thoughts with your team!)

_____

_____

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: A3 **Lesson:** **A3-PTL-A**	**Grade Level/Course:** Algebra 1/CC1	**Duration: 30–50 minutes** **Date:**
Common Core and Content Standards	Grade 4, Grade 5 Measurement and Data: Represent and Interpret Data	
Materials/ Resources/ Lesson Preparation	Handouts: Part 1: Matching Exercise Part 2: Concept, Skill, and Application Exercise Part 3: Concept, Skill, and Application Exercise	
Objectives	**Content:** Students will understand how to scale a number line to suit different situations in addition to thinking of the real life scenarios that match specific number lines.	**Language:** Students will speak, read, and write about the scaling of number lines to suit different situations in addition to writing about those situations. .
Depth of Knowledge Level	☒**Level 1: Recall** ☒**Level 2: Skill/Concept** ☒ **Level 3: Strategic Thinking** ☒ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☒ **1. Make sense of problems and persevere in solving them.** ☒ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☒ **4. Model with mathematics.** ☒ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☒ **7. Look for and make use of structure.** ☐ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** **In order to be successful with this unit, students must be familiar with the number line and know how to mark off units on it.** ☒ **Coherence within and across grade levels** **Correct use of the number line is essential for 6th grade as well as for future math classes.**	

		☐ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	
Academic Vocabulary (Tier II & Tier III)	**TEACHER PROVIDESSIMPLE EXPLANATION**	**KEY WORDS ESSENTIAL TO UNDERSTANDING**	**WORDS WORTH KNOWING**
		Increments scale	
	STUDENTS FIGURE OUT THE MEANING		
Pre-teaching Considerations		**Teacher:** Ensure that students are familiar with the fact that negative numbers go on the left of zero while positive numbers go on the right. In addition, ensure students know that numbers to the left of a number get smaller while numbers to the right increase in value.	
Lesson Delivery			
Instructional Methods		**Check method(s) used in the lesson:** ☒ **Modeling** ☒ **Guided Practice** ☒ **Collaboration** ☒ **Independent Practice** ☒ **Guided Inquiry** ☒ **Reflection**	
		Prior Knowledge, Context, and Motivation:	
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement		**Lesson Overview** **Teacher:** The Preparing The Learner lesson has been placed between 3a-1 and 3a-2 because students will be asked to represent their equation/inequality on a number line in 3a-2. Tell students that in order for them to be successful in this unit it is essential that they understand the scaling of units on a number line. Many times students don't know what numbers to place on the lines and when they do, the spacing between the numbers is incorrect. With this in mind, pass out **Part 1: Matching Exercise** handout to all students. **DOK Level 2 – Skills/Concept: Emphasis on Skills** **DOK Level 3 – Strategic Thinking** • **Independent Group Effort: Collaboration and Communication** • **Mathematical Practice(s) Being Monitored:** 2 Reason Abstractly and quantitatively 6 Attend to Precision Objective: Mathematically proficient students make sense of quantities and their relationships in problem situations.	**Differentiated Instruction:** **English Learners:** Students should be paired up with others. Provide linguistic frames to assist students with their discussions/explanations. **Students Who Need Additional Support:**

Lesson Continuum

Students: Match each scenario with the scale one would use for each situation. Then explain how you came to that conclusion. On the number lines graph your estimate to the situation by placing a point in the appropriate place.

Teacher:

Pass out **Part 2 and Part 3: Concept, Skill, and Application Exercise**

- **Independent Group Effort: Critical Thinking & Collaboration**
- **Mathematical Practices Being Monitored:**
  3 Construct viable arguments and critique the reasoning of others.

  Objective: Students make conjectures and build a logical progression of statements to explore the truth of their conjectures.

Provide each group or pair of students with linguistic frames (Based on the situation I would put these numbers _____ on the number line because _____, or Based on this number line, I would say the situation is _____) to help students finalize their understanding from Parts 2 and 3 of the Concept, Skill, and Application Lesson.

Students: Work in groups of two to complete both pages. The teacher walks around the room guiding conversations.

Use the provided structure below to carry out conversations about Part 2 and Part 3. Use a Round Robin Strategy so that all students take a turn sharing their answers.

Agree/Support	Disagree/Contest	Extend/Expound
4. _____ 5. _____ 6. _____	1. _____ 2. _____ 3. _____	1. _____ 2. _____ 3. _____

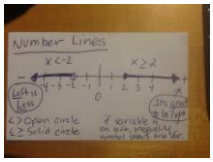
Students should be paired up with others.

Provide linguistic frames to assist students with their discussions/explanations.

Provide vocabulary card with simple definitions of academic vocabulary

Provide number line visual support.

Example:



Accelerated Learners:

Accelerated Learners may lead discussions.

Lesson Reflection

Teacher Reflection **Evidenced by Student Learning/ Outcomes**	

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Name: _____ Period: _____

Preparing The Learner Lesson – Algebra 1

Part 1: Matching Exercise

Scenarios:	Scales:
A: Michael is counting the number of fish in a bowl.	1: Count by thousands
B: Ana is wondering how many years the USA has been a nation.	2: Count by ones
C: The height of Mt. Everest.	3: Count by fifty.

Match one scenario and one scale. Explain your thinking. How did you come to this conclusion?

A) _____

_____

_____

B) _____

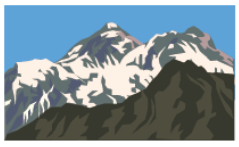
_____

_____

C) _____

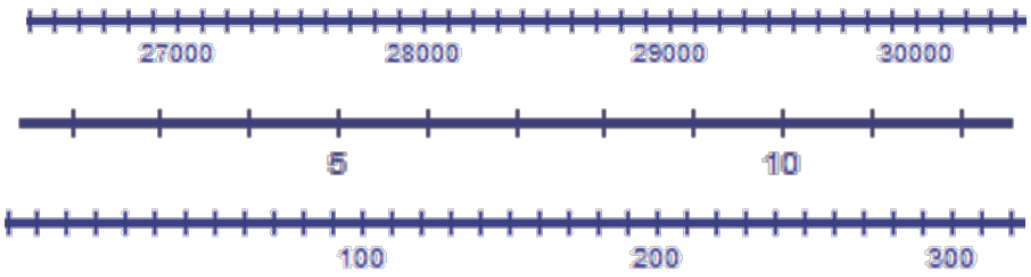
_____

_____

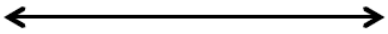
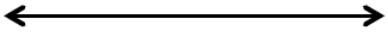
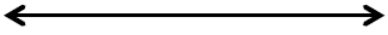
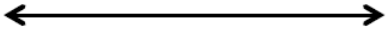
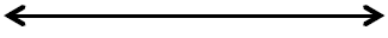
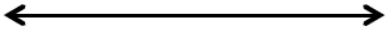
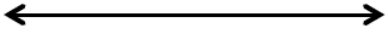


Estimate where you think the following scenarios would fit on one of the numbers lines below. Place a point where you think the point would fit.

a. Number of gold fish in a bowl (fish)
b. The age of the U.S.A. (years)
c. The height of Mount Everest. (feet)

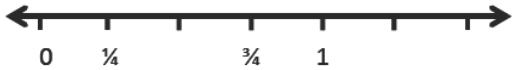
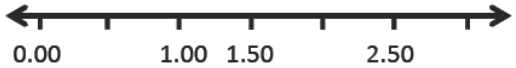
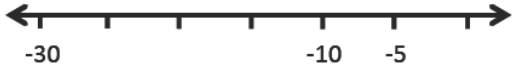


Part 2: Concept, Skill, and Application Exercise

Situation	Scale/Increment	Place numbers on number line
The number of people in a household		
The weight of an elephant		
The cost of a soda		
The winter temperature in Alaska		
The weight of a person		
The number of letters in a person's first name		
The speed of a car		
A person's weekly salary		

Part 3: Concept, Skill, and Application Exercise

Think of a real life situation that you would use for each number line. Fill in the missing numbers.

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<table>
<tr><td>Unit: 3
Lesson:3a- 2</td><td colspan="2">Grade Level/Course:
Algebra I</td><td>Duration: 1 period of 1 (50 minutes) Lesson
Date:</td></tr>
<tr><td>Common Core and Content Standards</td><td colspan="3">ACED.1—Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

ACED.3—Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, rep resent inequalities describing nutritional and cost constraints on combinations of different foods.</td></tr>
<tr><td>Materials/ Resources/ Lesson Preparation</td><td colspan="3">3a-2 Representing Equations and Inequalities handout packet
Flashcard activity
Tree map activity
Groups of 3-4 students</td></tr>
<tr><td>Objectives</td><td colspan="2">Content:

Students will demonstrate understanding of inequalities by correctly creating and representing solutions onto a number line and recognizing patterns of representations to given situations and justifying their reasoning with their teams.</td><td>Language:

Students will analyze the patterns of representations and justify their findings with writing summaries, verbally explaining their reasoning to their teams, and critiquing other’s work by reading their work.</td></tr>
<tr><td>Depth of Knowledge Level</td><td colspan="3">☐ Level 1: Recall ☒ Level 2: Skill/Concept
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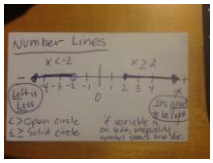
Inequality
Greater than, greater than or equal to
Less than, less than or equal to
Constant</td><td>Included, vs. not included
Variable</td></tr>
<tr><td>STUDENTS FIGURE OUT THE MEANING</td><td></td><td></td></tr>
</table>

Pre-teaching Considerations	This lesson involves high levels of team discussion and sharing of work. Students should be placed in groups of 3 or 4 to make the lesson work.		
Lesson Delivery			
Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☒ **Guided Practice** ☒ **Collaboration** ☒ **Independent Practice** ☒ **Guided Inquiry** ☒ **Reflection**		
	Prior Knowledge, Context, and Motivation: **Prior knowledge:** Students need to know what the inequality symbols represent and how to interpret them. **Context:** Students will need to determine the solutions given a context and be able to represent the information on a number. **Motivation:** Students are expected to have a high understanding inequalities and be able to create their own.		
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**Lesson Overview** Day 1 of 1: • **Independent Group Effort: Reading Comprehension & Collaboration** • **Mathematical Practice(s) Being Monitored:** **1: Make sense of problems and persevere in solving them** **3: Construct viable arguments and critique the reasoning of others** **6: Attend to precision** Objective: Students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. ***Lesson Structure:*** Students will be working in groups of 3-4 (identifying each student in the group as Student 1, Student 2, Student 3 or Student 4) with teacher as a facilitator. The teacher should be sure to be walking around guiding students with their work during group discussion time, making sure they're not going too far off track, but still allowing them the opportunity to struggle through problems. Suggested lesson activities ***Lesson Review:*** The purpose of this activity is for students to refresh their memory of the previous day's information to prepare for today's lesson. **5 minutes:** **Teacher:** Post an inequality from the previous day (x>5). Post the following questions for the students to discuss (Think-Round Robin-Share): • "What are the possible values of x? Explain your reasoning." • "How does the direction of the inequality affect the value of x? • What support/evidence/examples can you provide?"	**Differentiated Instruction:**	

Lesson Continuum

	Students: Students will be given approximately 1 minute of think time. They may choose to write down thoughts as well during this time. They will then be given approximately 2 minutes to perform the Round Robin within their groups to reflect on their thoughts (each person should speak for approximately 30 seconds), beginning with Student 1. **Teacher:** While students are performing the Round Robin task, as you're circulating, focus on a group or two to fully understand the conversation and their reasoning. The purpose of this is to understand their thinking and provide feedback for the entire class at the end of the activity. **Teacher:** Once all individual students have had a chance to share their thoughts within their teams, please take a moment to share with the class the discussions that you heard while listening to groups. From there, call on other students for feedback, clearing up any misconceptions and supporting the quality of reasoning. ***Team Practice:*** This particular activity gives the completed inequalities from the previous day. Students do not need to find the inequality again, as the purpose of today's activity is to create the representations. **15 minutes:** **Teacher:** Direct students to page 5 of the packet and have them read the directions independently (see suggested question below). Direct students to the example on top of the page for guidance. **Students:** Using the example to reference students will take 3 minutes to complete the worksheet as far as they can independently. They will record their representations using **pencil** (students may need to change their answers later, so this is essential). **Teacher:** Circulate around class, and allow students time to grapple with the problems and come up with their own methods to represent the information (do not explain *how* to do it yet). **Students:** Once 3 minutes have passed, students will switch papers with someone at their group. Students 1 and 2 will switch papers and Students 3 and 4 will switch papers. They will then have 30 seconds to give the other feedback, beginning with Students 1 and 3, giving feedback to their partners, then 30 more seconds for students 2 and 4 to give feedback to theirs. Possible feedback starters: "I like how you..." and "I wonder why you…" The papers will then be given back to the original owners and the group will then discuss ideas that they saw. At this point, students will be able to change any representation that he or she wishes once hearing the group's feedback and complete the remainder of the worksheet. **Teacher:** Do not go over the correct representations yet. This will come after further guidance. **Suggested Questions:** #1--After students have independently read the directions at the top of the page ask: • "What do the directions tell us to do?" Call on a student to answer this question, being sure that students are clear as to what the problem wants for them to do, and considering vocabulary as well ("represent"). #2—Looking at the example at the top of the page, how was this inequality represented? • Why might one side of the number line be shaded and not the other? What do you notice about the locations of the x, the constant, and the direction of the sign in the inequalities? **15 minutes:** **Teacher:** Have students collaboratively work on the first page of 3a-2 Student Handout. Students may work in pairs or group. During this time, teacher circulates around the room to clarify any misunderstanding. Teacher may help students identify the shaded part of the number line by asking students to check for their understanding.	**English Learners:** See Suggested Question #1, #3, review key vocabulary using symbols as visuals in prominent location of classroom **Students Who Need Additional Support:** Teacher, paraprofessional or peer study buddy: Read all questions aloud Teacher: Provide vocabulary card with simple definitions of academic vocabulary. Write feedback starters on board. Provide number line visual support. Example:  See Suggested Question #2 giving students time to discuss how the example may guide them. **Accelerated Learners:** At the bottom of the page create examples independently, see suggested question #4

- How do we know which part of the decision point to shade? (hoping for a tester number to plug in)
- What method would you use to test if a certain part is right?
- How does that method support your findings?
- Does this method help with the next problem? How so?

Students: May move on as soon as they're done with the first 4 contextual problems with different representations.

10 Minutes
Teacher: Have students read the text-complexity regarding boundary points and complete the page collaboratively. At this time, teacher will circulates, but focus on one of two weakest teams to help clarify misunderstanding or conceptions. Ask leading questions to help students build the correct understanding of the text.
Suggested Leading Questions:

- How do you determine the boundary point? How is it represented in context? In the inequality? Or on the number line?
- How do you determine the shades of the boundary point? What evidence did you find in the texts on this page to support you with that understanding? How do you go about using that shade?

Students: Work collaboratively and check each other's work. The structure for this activity can be found below using the **Clarifying Bookmark** or **Dyad Share** structures:

- **Suggested Metacognitive Activity – Clarifying Bookmark I**

Students: Use the following linguistic frames to communicate/explain their understanding with peers.

What I can do	**What I can say**
I am going to think about what the problem may mean.	*I'm not sure what this is about, but I think it may mean…*
	This part is tricky, but I think it means…
	After rereading this part, I think it may mean…
I am going to summarize my understanding so far.	*What I understand about this problem so far is …*
	I can summarize this part by saying…
	The main points of this section are …

- **Suggested Engagement/Structure of Collaborative Group – Dyad Share**

Agree/Support	Disagree/Contest	Extend/Expound
7. _____ 8. _____ 9. _____	1. _____ 2. _____ 3. _____	1. _____ 2. _____ 3. _____

Teacher: Once students have the opportunity to exchange ideas and correct their own work and answers, hold a whole-class discussion to ensure boundary point concept is understood. Use the following leading questions to lead the discussion:

Suggested Leading Questions:

- How do you recognize if the context is referring to an Equation or Inequality?
- Once you decided a contextual problem is an equality, how would you use the context to represent it in multiple representations mathematically and graphically?
- What is the purpose for different representations d? What is the purpose of each?

Students: Students will continue onto the next page where they are asked to represent different situations in multiple representations given one representation.
Teacher: Can ask leading questions to help students decide the correct boundary points or clarify other problems.
Suggested Questions:

- What does this problem want for you to do?
- What happens if we switch the location of the x with the constant?
- What effect does this have on the representation?
- What if the direction of the inequality switches?

Class Activities:

10 minutes:

Flashcards

Students: Each student will get one of the attached flashcards. Each card contains a situation in context, an inequality, a verbal representation, or a graphical representation. Each student will walk around the room and find his or her matches. Encourage them to discuss why or why not their cards are matches. Once they have found each other they will sit in a group together in a team of four. (Note: if your class cannot be split into even groups of four then depending on the number of students in your class you may need to do a few groups of three). Once they are sitting with their new, temporary group post the correct matches on the projector and see if students agree or disagree.

15 minutes:

Page 7

Students: (Option: teachers may decide to keep students in their flashcard group or have them move back to their original groups).

Think-group-share: Students will open their packets to page 7. Have them try the first item independently, giving them approximately one minute to work on it. Students will then discuss their solutions with their group and make any necessary changes. Give the students 10 minutes to complete the remaining 6

English Learners:
Refer to key vocabulary terms.

Students Who Need Additional Support:
Provide the examples of the inequalities. Remind students to use their visual supports if needed.

Accelerated Learners:
Have students add a fourth branch to their tree map entitled "Context" where they will come up with a story to go with their representations.

English Learners:
See option 2

Students Who Need Additional Support:
See option 2

Accelerated Learners:
See option 1. Ask students to provide specific examples to backup their

	problems discussing with their group. Let students know that when time is up you will be bringing one person's paper as a representation of the team. When 10 minutes are up, choose 1 student at random, and bring up their work for the class to discuss with positive comments. If time permits, have students complete the tree map activity below: **10 minutes** **Group tree maps** **Students:** Students will individually create a Tree Map with the following 3 branches: "2 Inequalities" (e.g. x<3 or 3>x), "In Words" (x is less than 3 or 3 is greater than x), and "Representation" (number line)—provide the examples for students if they need additional support. Students' only instruction will be to be sure to include each inequality at least once. From there, they will have two minutes to create as many examples as they can. They will then perform a "Map Pass" where Student 1 will pass his map to Student 2, who will pass his map to Student 3, so on and so forth. When the map is passed the students will look at the previous student's work and make any necessary corrections. When that is complete they will then add a new example to the map that has been handed to them, and then pass it to the next student. The map gets passed around until it reaches the original owners. The original owners will then look over it and make any more necessary corrections. **Teacher:** Circulate the room and keep an eye on student work making sure students are following directions properly. If students wish to give verbal feedback during this process then encourage them to do so. When students have completed the "Map Pass" bring up one student's map at random to project for the class to see. Encourage students to give feedback on that students' work using positive phrases only. ***Closure:*** *5 minutes* **Students:** Option 1: Complete a brief summary of what we have learned in today's lesson. Option 2: For students needing additional support, complete the following sentence frames: When representing an inequality on a number line, if x is less than the constant then we_____. If x is greater than the constant then we_____. If a representation of an inequality has a shaded boundary point that means_____. If the boundary point is unshaded then_____. **Teacher:** After four minutes, call on students at random to share out what they wrote to the class giving feedback and being open to other's feedback with positive comments.	statements.
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

3a-2 Representing equations and inequalities

Revisit the problems from yesterday, and represent the solutions on a number line.

Context	Equation or Inequality *ex.* $x > 8$	Representation
Javier has enough to pay for his lunch at the amusement park. Lunch costs $10. What are the possible amounts that he may have?	$x \geq 10$	
Ms. G wants to take her Avid class to Knott's for their end of the year field trip. It will only happen if more than 20 students pass the math test. How many students need to pass?	$20 < x$	
There has to be more than 20 students but no more than 60 on the bus. How many students can fill one bus?	$20 < x \leq 60$	
Each log on the log ride fits no more than five people. If you have less than five people, then the ride will not go. How many riders must be on log?	$5 = x$	

What patterns did you notice? How do you determine the direction of the shaded line? Discuss these questions with your team and record your responses below.

When graphing solutions onto a number line, the two symbols below are used to represent the **boundary point:**

Sometimes the circle is *shaded* and sometimes it is *un-shaded*. What do you think these symbols might represent? What do you think determines whether or not the boundary point is *shaded* or *un-shaded*? Talk with your teams and record your answers below:

Given

= "is equal to"
> "is greater than"
< "is less than"
≤ "is less than or equal to"
≥ "is greater than or equal to"

Given

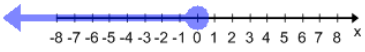
= ●
> ○
< ○
≤ ●
≥ ●

What patterns did you notice? When are the circles *shaded*? When are they *un-shaded*? Feel free to change your number lines on page 5.

● This symbol represents a boundary point being included.

○ This symbol represents a boundary point *not* being included.

Apply your new understanding to the table below:

Context	Equation/Inequality	Representation
Tommy has more than $5 in his pocket.		
		
	$3 \geq x$	
		
	$x = 7$	
To ride Space Mountain, you must be at least 50 inches tall.		
Create your own!		

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SAUSD Common Core Lesson Planner Mathematics Teacher:_____

<table>
<tr><td>Unit: 3

Lesson: 3a-3</td><td>Grade Level/Course:

Algebra I/CC1</td><td colspan="2">Duration: 1 of 1 of (50 mins) Lesson

Date:</td></tr>
<tr><td>Common Core and Content Standards</td><td colspan="3">A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

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.</td></tr>
<tr><td>Materials/ Resources/ Lesson Preparation</td><td colspan="3">Materials: “Algebra 1 – Unit 3 Equations & Inequalities In One Variable” packet, lesson 3a-3 (pages 8 – 11)</td></tr>
<tr><td>Objectives</td><td colspan="2">Content:

Students will learn about inverse operations and solve one-step equations and inequalities using inverse operations and properties of arithmetic.

• Skills: Students will solve one-step equations and inequalities by reasoning through equations within context and equations written symbolically. Students will use the cover-up method to solve simple equations.
• Concepts: Students will understand the concept of inverse operations by discussing scenarios that seem to evoke actions that “un-do” each other. Students will use their intuitive knowledge about equations to solve for an unknown without relying on traditional algebraic practices. Students will reconcile this intuitive understanding by using the “cover-up” method.
• Application: Students will solve equations within a given context and will translate parts of a word problem into equations.</td><td>Language:

Students will discuss, defend, and justify their ideas about inverse operations and solve one-step equations and inequalities using language, written representations, and physical gestures (“cover-up” method).

• Skills: Students will read and interpret clues within a word problem to answer questions. Students will use written representations, and physical gestures to solve one-step equations and inequalities.
• Concepts: Students will discuss, defend, and justify their ideas about inverse operations as actions that “un-do” each other. Students will use written representations and physical gestures to solve one-step equations and inequalities.
• Application: Students will read a word problem for clues and discuss possible solutions with other students.</td></tr>
<tr><td>Depth of Knowledge Level</td><td colspan="3">☒ Level 1: Recall ☒ Level 2: Skill/Concept

☒ Level 3: Strategic Thinking ☐ Level 4: Extended Thinking</td></tr>
<tr><td>Standards for Mathematical Practice</td><td colspan="3">☒ 1. Make sense of problems and persevere in solving them.

☒ 2. Reason abstractly and quantitatively.

☒ 3. Construct viable arguments and critique the reasoning of others.

☒ 4. Model with mathematics.

☐ 5. Use appropriate tools strategically

☒ 6. Attend to precision.

☒ 7. Look for and make use of structure.</td></tr>
</table>

		☐ **8. Look for and express regularity in repeated reasoning.**
Common Core Instructional Shifts in Mathematics		☒ **Focus on the Standards** 1) Students explore the concept of inverse operations by discussing scenarios that seem to evoke actions that "un-do" each other. Students use this big idea to make a connection to mathematics and inverse operations. 2) Students explore the concept of modeling problems with mathematics by using their intuitive understanding of solving basic one-step equations. This lesson assumes that students have a strong understanding of how to solve simple equations *without* formal instruction. Offer students a model to validate their understanding of how to solve basic equations by introducing the "cover-up" method as a way to solve equations. Take the focus away from procedures and reinforce the concept and big ideas; by the end of this lesson, students will be able to reason through a basic one-step equation or inequality without having to refer to traditional algebraic practices. ☒ **Coherence within and across grade levels** The two pillars of this lesson are the concept of inverse operations and using properties of arithmetic to solve one-step equations and inequalities. Teachers must provide opportunities for students to make sense of mathematics, and this lesson is not designed to teach students procedures on how to solve one-step equations and inequalities but rather to have students reconcile their innate understanding of solving one-step equations and inequalities with the conventions of algebra. At the end of this lesson, students may not be experts at recreating a procedure—this will come with practice—but they should be able to explain the concept of inverse operations and what it means to solve a one-step equation or inequality. Encouraging students to make sense of these concepts will give students the opportunity to take ownership of their learning. ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)** The key to this lesson is developing the concepts and drawing from students' innate understanding of solving basic one-step equations and inverse operations. Students will be asked to: - Justify their understanding of inverse operations - Apply their understanding of "inverses" to mathematics - Make sense of a complicated word problem and persevere in solving it - Apply mathematical conventions to create equations that model a word problem. - Reconcile their understanding of solving equations and inequalities by using the "cover-up" method - Use their skills and procedural fluency to complete practice problems - Represent a solution or set of solutions to a one-step equation or inequality by using the "cover-up" method, algebra, and a number line - Create their own one-step equation or inequality
Academic Vocabulary (Tier II & Tier III)	**PROVIDES TEACHER SIMPLE EXPLANATION**	**KEY WORDS ESSENTIAL TO UNDERSTANDING**: inverse operation, "un-do" equation, inequality, inverse, solve **WORDS WORTH KNOWING**: inverse, "un-do", equation, inequality, model, "more than", "is"
	STUDENTS FIGURE OUT THE MEANING	inverse operation "un-do"

Pre-teaching Considerations	Students should have a functioning knowledge of equations and inequalities, and should be able to represent and identify solutions to both. Students should also be familiar with the conventions of algebraic notation with regards to equations and inequalities.		
Lesson Delivery			
Instructional Methods	**Check method(s) used in the lesson:** ☒ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☒ **Independent Practice** ☒ **Guided Inquiry** ☒ **Reflection**		
	Prior Knowledge, Context, and Motivation: Prior knowledge: Students know the difference between equations and inequalities. Students can translate word problems using symbolic notation (e.g., "Cecil has $4 more dollars than Rosa" can be modeled as □ = □ + 4 or □ = □ − 4) Context: Students reconcile their innate ability to solve simple equations and inequalities with algebraic conventions and inverse operations. Motivation: Students are expected to arrive at the "Big Ideas" by thinking critically, justifying their assumptions, and by persevering in problem solving.		
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**Lesson Overview** **3a-3 Inverse Operations and Solving Equations and Inequalities handout** **10-15 Minutes – Preparing the Learner Moment** • **Independent Group Effort: Reading Comprehension & Collaboration** • **Mathematical Practice(s) Being Monitored:** 3: Construct viable arguments and critique the reasoning of others Objective: Students will analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of other students. **Teacher:** Have students work collaboratively on the first page of this handout in groups of 4. Please see the structure below to help support students' collaborative effort using **Dyad Share** structure: **Agree/Support** | **Disagree/Contest** | **Extend/Expound** 10. _____ 11. _____ 12. _____ | 1. _____ 2. _____ 3. _____ | 1. _____ 2. _____ 3. _____ **Teacher:** Have students read the prompt on their own and identify each of the scenarios as either actions that "un-do" each other or actions that do not "un-do" one another. You may consider having students check the scenarios that resemble	**Differentiated Instruction:** **English Learners:** **Students Who Need Additional Support:** Teacher, paraprofessional or peer study buddy: Read all questions aloud Teacher: Provide vocabulary card with simple definitions of academic vocabulary. Use sentence starter for Main idea blank on #3a-3:

Lesson Continuum

inverse operations and place an "x" next to scenarios that do not. It may also be a good idea to tell students that they will learn two "Big Ideas" in this lesson, and that they are connected. This lesson is intended to enforce the concept, and as such should be referred to as a "Big Idea" day—if time permits, students will have time to practice solving one-step equations and inequalities.

> **Teacher note:** Make sure you have reviewed the actions listed on the first page of 3a-3. Each scenario is intended to resemble an action that resembles inverse operations at first glance, however, upon closer observation some will reveal themselves as not.

It is my opinion that the following scenarios most closely resemble the concept of inverse operations:

- Juan wakes up and ties his shoes. When he gets home, he unties his shoes.
- Juan makes a mess in his room, and then cleans his room.
- Lassie dug a hole for his bone in the backyard, and then filled the hole.

Teacher: After students have gone through the list themselves, have them share their results with the rest of the group using the Reflection-Group-Share method. Please use the suggested inquiry for this activity. (Pay attention on the justification rather than a correct answer)

Suggested Inquiry for Reflection-Group-Share:

1. What is the purpose of this example?
2. How does the work help achieve the purpose?
3. What is the main idea of this example?

Teacher: As students discuss which scenarios seem to evoke the concept of inverses, offer students questions to consider. For example, if students are having difficulty determining whether or not the scenario in which "Todd put $20 in his wallet, later in the day it fell out of his pocket" evokes the concept of inverses, ask "Is money falling out of your wallet the opposite of putting money into your wallet?". Encourage students to apply the reverse since inverses must work both ways (i.e., addition *undoes* subtraction just as subtraction *undoes* addition).

After students have had time to reach a consensus on each scenario, have students perform the following activity to capture the purpose of this reading:

Extended Anticipatory Guide

Statement	**Discussion Points**	**My conclusion**
1. The purpose of this reading is _____.		
2. The main idea of this reading is _____.		
3. The main idea is to _____.		

Inverse operations are:

_____

Accelerated Learners:

I would suspect students to leave remarks such as:

- Inverse operations are operations that un-do one another like addition and subtraction.
- Inverse operations are things used in math that are sorta like opposites
- Inverse operations are things that "un-do" each other and they have to work both ways.

Encourage multiple perspectives and have students share their ideas with a neighbor and/or the whole class.

Problem solving task (15-20 minutes):

Alex & Jocelyn at Knott's problem.

- **Independent Group Effort: Reading Comprehension & Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  1: Make sense of problems and persevere in solving them
  Objective: Students analyze givens, constraints, relationships, and goals and make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt.

Teacher: Have students work on this page collaboratively in their group. Teacher may circulate around the classroom to listen to their conversation and may jump in to help guide their thinking by asking leading questions.

Suggested Leading Questions:

- What do you know about this problem?
- Is there any extraneous information? If so, what is it? Can you leave out that information and still be able to solve the problem?
- How are those numbers working together to help you in this problem?
- Explain what you know and what you asked to do. What are your unknowns?

Reading with Purpose -Three-read."

- Teacher asks the students to read the text once. The first read purpose is "What is the problem about?"
- Second read "What are the quantities in the problem?
- Third read "What is the question? What are the possible questions that might be asked from the students? Can you come up with other questions regarding the text?

Answers:

1) At the start of the day, **Alex had $30 and Jocelyn had $25**.
2) At noon, **Alex had $20, and Jocelyn had $15** since they split a $20 lunch bill.
3) At 2:00 PM, **Alex had $7 (having spent $13 on souvenirs), and Jocelyn had $12**. (At this point, Alex has spent a total of $23 and Jocelyn has spent a total of $13)
4) At the end of the day, **Alex had $5 and Jocelyn had $6** since Alex had spent $6 more than Jocelyn. At the end of the day, Alex had spent a total of $25 and Jocelyn spent a total of $19 since it states in the problem that Alex had spent $6 more than Jocelyn.

Let students struggle with the problem. **Do not** offer equations as a method to

	answer the questions. Allow students to tackle the problem on their own and if they are having trouble, encourage students to tally how much Alex and Jocelyn have after each scenario *and* how much they have spent. Keep in mind that modeling equations is **not** the purpose of this activity. The wording is intentionally cumbersome as it is meant to encourage students to revisit the text several times as they answer each of the questions. **Teacher:** Have students move on to the rest of the page to manipulate different representations of the inequalities. Encourage students to discuss and share solutions. Teacher: May perform the I-Spy activity once you see the struggling team that needs feedback from each other. See structure below. • **I Spy** (Send a Spy) ○ When the team is stuck, one student can go around to another team and listen in Student reports back to the team what was learned.	
Lesson Reflection		
Teacher Reflection **Evidenced by Student Learning/ Outcomes**		

3a-3 Inverse Operations and Solving Equations and Inequalities

Here is a list of things people do every day. Decide which of the activities are things that "un-do" each other.

Juan wakes up and ties his shoes. When he gets home he unties his shoes.

Juan makes a mess in his room, and then he cleans his room.

Rose wrote the answer to a problem, and then erased it.

Lassie dug a hole for his bone in the backyard, and then filled the hole.

A quarterback ran 5 yards, but then got sacked and lost 5 yards.

Todd put $20 in his wallet, later in the day it fell out of his wallet.

Maria filled her tank with gas, drove a long distance, then ran out of gas

Jorge got paid $300 then spent all of it on a new iPod

Greg owed $10 to his uncle then found $10 on the street to give him

The soccer ball was deflated so the coach filled it with air.

The idea of "un-doing" something occurs in mathematics as well. In math, we call these **inverse operations**. Using what you've learned about "un-doing" something, fill in the blanks below:

The **inverse operation** of addition is _____.
The **inverse operation** of subtraction is _____.
Multiplication is the _____ **operation** of division.
The **inverse** _____ of _____ is multiplication.

To undo $+3$, you must _____.
To undo -2, you must _____.
To undo $\times 3$, you must _____.
To undo $\div 7$, you must _____.

Main idea:

_____

_____

Alex and Jocelyn are headed to Knott's on a field trip with Ms. Obtuse. Alex's parents gave him $30 and Jocelyn's parents gave her $25. At 11:30 AM, Alex and Jocelyn grabbed lunch. The bill came to $20 and Alex and Jocelyn decided to split the bill. At 2:00 PM Jocelyn met up with a few of her other friends and spent some money playing games, and Alex and bought souvenirs for his brothers and sisters. At this point, Jocelyn had $5 more than Alex who had $7 in his pocket. Near the end of the day Alex went and bought ice cream, while Jocelyn went to the gift shop. At the end of the day, they met at the front of the park and after counting their money they found that Alex had spent $6 more than Jocelyn. Alex had $5 left when he returned home.

Scratch work:

1. How much did Jocelyn and Alex have at the start of the day?
2. How much money did Jocelyn and Alex have at noon?
3. How much money did Jocelyn and Alex have at 2:00 PM?
4. How much money did Jocelyn and Alex have at the end of the day?

Equations can be used to _____. They can be solved to find _____ value. For example, the equation $x-3=7$ can be used to model the following problem

"_____
_____?"

Inequalities can also be used to _____. They can be solved to find_____. For example, the inequality $x-3>7$ can be used to model the following problem,

"_____?"

Equations and inequalities can be solved using **_____.**

$x - 3 = 7$

Write the equation above in words:

_____

$x - 3 > 7$

Write the inequality above in words:

_____

Revisit problems 2 through 4 on page 9. Write and solve equations or inequalities for each problem.

2.	3.	4.

Let's Practice!

In words	Equation or Inequality	Representation
Jaime had $4 at the end of the day. She spent $13 on food and groceries. How much did she have at the start of the day?		
	$15 > 3x$	
Jose has $12. His friend borrowed some money, and now Jose has less than $8.		
Three more than a number is nine		
Make your own!		

Main idea:

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: 3 **Lesson: 3c-1**	**Grade Level/Course:** Algebra 1	**Duration: 2 of 2 of (50 minutes) Lesson** **Date:**
Common Core and Content Standards	**A.CED.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non- viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.	
Materials/ Resources/ Lesson Preparation	A designated place in the classroom for measuring students' height, prepared by teacher prior to the lesson, or each group is given a measuring tape or a yard stick.	
Objectives	**Content:** Students are to solve equations/inequalities within context.	**Language:** Students will be able to communicate (orally, in writing, and through other representations) about concepts, procedures, strategies, claims, arguments, and other information related to problem solving
Depth of Knowledge Level	☒**Level 1: Recall** ☒**Level 2: Skill/Concept** ☒ **Level 3: Strategic Thinking** ☒ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☒ **1. Make sense of problems and persevere in solving them.** ☒ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☒ **4. Model with mathematics.** ☒ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☒ **7. Look for and make use of structure.** ☒ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** ☒ **Coherence within and across grade levels** ☐ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	
Academic Vocabulary (Tier II & Tier III) / **PROVIDES TEACHER SIMPLE EXPLANATION**	**KEY WORDS ESSENTIAL TO UNDERSTANDING**	**WORDS WORTH KNOWING**
	Compound Inequalities	Minimum

STUDENTS FIGURE OUT THE MEANING		
Pre-teaching Considerations		

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☒ **Guided Practice** ☒ **Collaboration** ☒ **Independent Practice** ☒ **Guided Inquiry** ☐ **Reflection**
	Prior Knowledge, Context, and Motivation: The students need to know how to convert feet to inches and how to measure their own height. How to represent all inequalities in a number line by shading the solutions and using the appropriate boundary point: open circle or closed.

Lesson Continuum

Body of the Lesson:

Activities/ Questioning/ Tasks/ Strategies/ Technology/

Engagement

Lesson Overview

Day 1 of 3:

3c-1 The Theme Park Ride Handout

- **Independent Group Effort: Reading Comprehension & Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  3: Construct viable arguments and critique the reasoning of others
  Objective: Students will analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of other students.

20 minutes

Problems 1, 2 and 3

Teacher: Have students perform a close read strategy on problem 1 collaboratively. Teacher acts as a facilitator to help groups of students who need the help. Provide the Three-Read strategy to help students understand the problem.

Activity name "**Reading with Purpose -Three-read**."

Teacher asks the students to read the text with the following purposes.

- First read "What is the problem about?"
- Second read "What are the quantities in the problem?
- Third read "What is the question? What are the possible questions that might be asked from the students? Can you come up with other questions regarding the text?

Teacher: Provide support by asking leading questions:

Differentiated Instruction:

English Learners:

Leading questions

Students Who Need Additional Support:
Teacher, paraprofessional or peer study buddy:
Read all questions aloud

Teacher:
Provide vocabulary card with simple definitions of academic vocabulary (minimum, maximum).
Write on board:
1 yard

Provide vocabulary card

- What is the problem about? What's the intention of the problem? And how are you going to solve it?
- Prior to getting to the question, is there any other work you need to know in order to perform the task? What will that be? Why?

Students: May work collaboratively and use the Think- Pair-Share-Write strategy is applicable in this case as students will be given opportunity to "think quietly and individually about the question", "share with a partner to double-check, and finally "write to reflect on their own learning".

Teacher: May want to provide the tools for students to measure their height. May need yard stick or may not. This is the part where you have students practice Mathematical Practice 6: Use tools strategically.

Students: Students should be following teacher's prompts and actively engaged in the activities. After the close read and the measurement students must fill out the blanks independently, that is the Writing part of the Think-Pair-Share-Write

Teacher asks the following questions specific to the problem to provide additional support.

- What are the requirements for any person to ride the Silver Bullet?
- How many requirements are there?
- Can Berry ride the Silver Bullet? Why or Why not?
- Can Mark ride? Why or Why not?

Within your group come up with the requirements. Remind the students that one person has to speak and the others have to listen. Post or give the following sentence starters: I agree with ….., I also think that….., I also noticed that

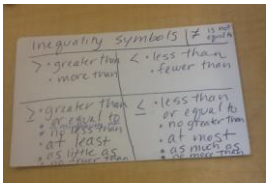
30 minutes
Problem 4 -7
Teacher: have students read the boxed explanation and draw the class together to ask for their understanding using the **Clarifying Bookmark #1.**

- **Suggested Clarifying Bookmark Structure:**

What I can do	**What I can say**
I am going to think about what the text may mean.	*I'm not sure what this is about, but I think it may mean…*
	This part is tricky, but I think it means…
	After rereading this part, I think it may mean…
I am going to summarize my understanding so far.	*What I understand about this problem so far is …*

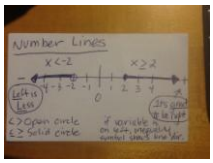
with inequality symbols and words used for each.

Example:



Provide number line visual support.

Example:



Option 2: Maximum Teacher Scaffolding

Teacher needs to emphasize that there are two requirements that they need to compare themselves with. Teacher directs the students back to the text and asks them to find the height requirements. What mathematical evidence in the text helps us determine the requirements? The teacher asks a randomly selected student to share what they filled out for example 1 and the class and the teacher records it together.

Accelerated Learners:

	I can summarize this part by saying…	Ask the students to come up with an example of another compound inequality and one that is not a compound inequality.
	The main points of this section are …	

Teacher: Ask leading questions to help the discussion among students or within groups by
These questions if discussed in a larger group will be a form of **Math-Talk:**

- What does x represent?
- What do you understand about "AND"?
- How does "AND" play in the combination of two inequalities?
- How is restriction being represented?
- What does it mean when these two inequalities put together?
- What's being combined and what's still being left alone? For what purpose?
- If x can represent the **Problem 3a, 3b, Students:** Students write 3a and 3b and then share out loud with the group what they have recorded.

Teacher: have students move on to Problem 4 & 5 in the remaining time. During this time, circulate and provide leading questions to help facilitate the conversation.

Mathematical Practice(s) Being Monitored:
7 Look for structure
3 Construct viable arguments and critique the reasoning of others

- How do these problems relate to the discussion we had earlier?
- How did the last discussion help inform us of these problems? In what way? How is it going to be done?
- How are these problems the same? Different? In what way? How do you adjust their differences using the same structure we had?
- How does your team agree/disagree with your statements? How can you support your idea?

Day 2 of 2:

5 Minutes

Math Talk

Teacher: Show the premade examples and non examples of compound inequalities and have the students identified them verbally within their group. Ask the students to refer to page 12, example 3c and read the definition on page 13. Then ask the following question:

- Which of the following problems are examples of compound inequalities and which one are not? Why and why not? Support your reasoning with the text provided from yesterday's work.

A) $\square < 7$ $\square\square\ \square \geq 10$, B) $\square \geq 15$, C) $\square < -3$ D) $-5 \leq \square \leq 0$

E) $\square \geq 15$ $\square\square\square\ \square < 25$, $15 \leq \square < 25$

Sentence frames that Students can use: According to the definition I think …. According problem 3c, I think …..,

10 -20 min

Problems 4 – 7 Independent Group Effort

Teacher Comments: Work within you group and show work for problems 4 and 5. I will assign each of you a responsibility while working on this page.

Project the roles for each person while students are working:

1) Resource Manager: Calls the teacher over for questions regarding each problem.

2) Facilitator: Makes sure everyone understands team's answer. Makes sure that all students are using open circle or closed circle for the visual representation.

3) Reporter: Shows the teacher the problem that the Resource Manager is asking about.

4) Task Manager: Makes sure that everyone in the team is recording the work in their own worksheet. Helps the team stay on task.

Teacher monitors and circulates to help the groups and holds the students countable for their jobs(responsibilities)

Scaffolding Questions and Ideas to ask students:

- Do you need to use less than or less than or equal to?
- Why these examples are called compound inequalities?
- How do you know?
- What does the shaded number line represent?

If students are making graphing mistakes ask them to refer back to the notes regarding open or closed circle and how to shade the number line to show the solutions.

5 Minutes

Math Talk:

Display the premade examples and directions

Which of the following situations are examples of compound inequalities? Why or why not?

- The recommended tip in a restaurant is between 15 and 20 percent of the total bill.
- You must be 18 years or older in order to buy a lottery ticket.
- If you buy an airline ticket to Europe before June it will cost you less than $1000, but if you buy it after June, it will cost you more than $1400.
- The price of a movie ticket on Saturdays is more than or equal to $8.

Provide sentence starters for EL support:

I think example ___ is / is not a compound inequality because……

I agree/disagree with ____ , because_____.

	According to the definition for compound inequality, example ___ has _____. **20 minutes** **Problems 8 to 10 Independent Group Effort** **Students might need more time on finishing problem 7.** Continue with the same role descriptions as the day before and display them. Hold students accountable while walking around and facilitating. **Scaffolding Questions and Ideas to ask students:** • In what case do you need to use "is less than", "is less than or equal to"," is greater than", or "is greater than or equal to?" Why do we need to use the word ***or*** for example 7? • Why these examples are called compound inequalities? • How do you know? • What does the shaded number line represent? • Why did you use open /closed circle? If students are making graphing mistakes ask them to refer back to the notes regarding open or closed circle and how to shade the number line to show the solutions.	
Lesson Reflection		
Teacher Reflection **Evidenced by Student Learning/ Outcomes**		

3c-1 The Theme Park Ride

1. You and a friend entered a contest and won two tickets to Knott's. Both of you decided that you want to ride on Silver Bullet first.

The **minimum** height requirement is 54 inches and the **maximum** is 84 inches.

Your friend is 62 inches tall. Your height is _____ inches.

Can both of you ride together? _____, because _____

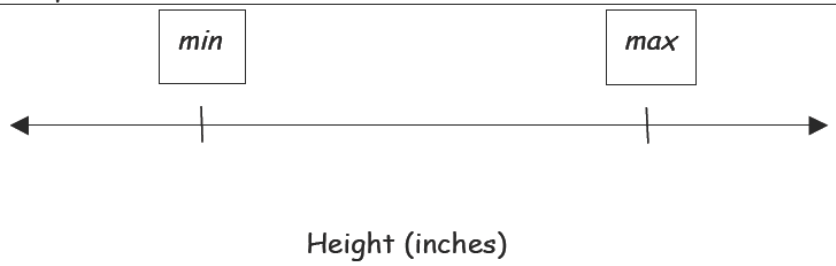
_____

There are many people including little children that want to ride the Silver Bullet. Represent the height restrictions mathematically.

2. For the following guests decide whether or not they meet the height requirements. Represent the information on the given number line below. Label each person's first name initial on the number line.

Guest	Height
Juan	61 in
Sarah	70 in
Christi	55 $\frac{1}{2}$ in
Alberto	3 ft
Berry	54 in
David	73 in
Nicole	65 in
Rachel	42 in
Teresa	5 ft
Mark	7ft 2in

Visual Representation



List all riders who are eligible to ride:

_____

3. Let x represent the heights of all qualified riders:

What must x be greater than or equal to? $x \geq$ __

AND

What must x be less than or equal to? $x \leq$ __

According to the safety rules, **both** height requirements must be met in order to ride.
Create a **compound inequality** to represent the height restriction mathematically.

$$\_\_ \leq x \leq \_\_$$

Why do you think this is called a **compound inequality**?

_____

_____

Definition: A compound inequality is two inequalities joined by the word *and* or the word *or*.

4. Your task is to create **compound inequalities** for the following situations and represent them on a number line:

a) Today's temperature will reach a high of 70°F and a low of 54°F . ____ ≤ t ≤ ____

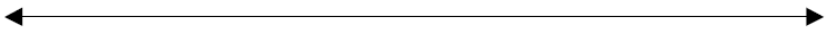
b) In 2012, a household income in the USA making more than $40,000 and less than $95,000 a year was considered middle class. $40{,}000 \quad m \quad 95{,}000$

c) Assuming there is no traffic on the 405 freeway, the fastest a person can legally drive is 65 miles per hour, and the slowest is 45 mph. _____

d) According to the FDA, milk should never be warmer than 45°F or cooler than 32°F while storing it. _____

e) According to salary.org, the average hourly wage without a college degree is between $8 and $15. _____

f) Water turns to solid when it reaches 32°F. However it becomes a gas when it reaches 212°F. Write a compound inequality for when water is a liquid. _____



5. Consider your original hypothesis of what a **compound inequality** is (from page 12) and the definition at the top of this page. Write a *new* definition of a **compound inequality** in your own words:

Refer back to examples 4a to 4f. What do all number lines have in common?

6. Create a compound inequality to represent the heights of the guest who were not allowed to ride on the Silver Bullet.

Guests are not allowed to ride the Silver Bullet if they are less than _____ inches, $x <$ ___

OR

Guests are not allowed to ride the Silver Bullet if they are more than _____inches, $x >$ ___

Represent the guests that **are not allowed** to ride graphically on a number line.

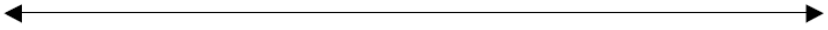
The **compound** _____ that represents the guests who ***can*** ride was _____.

The **compound** _____ that represents the guests who ***can't*** ride is: $x <$ ___ *or* $x >$ ___

Definition: A compound inequality is two inequalities joined by the word *and* or the word *or*.

7. Your task is to create **compound** _____ and represent them on a number line:

a) Write a _____ **inequality** for the temperatures when water in **not** a liquid, and then graph your answer below. $x \leq$ ___ *or* $x \geq$ ___



b) Describe the temperature that you should not store milk at mathematically and graphically.

c) Write a compound inequality that would describe unlikely air temperatures in Orange County, CA. Represent it on the number line.

d) Refer back to problem 4c. Write a _____ **inequality** for a situation when you **could** get a ticket.

8. Compare and contrast the two types of **compound inequalities** using a diagram of your choice.

9. Use your own words to describe the difference between compound inequalities with ***and*** and ***or.***

_____
_____
_____
_____

10. Create two stories and represent them with compound inequalities and graphs.

and	***or***

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: A3 **Lesson:3c-2**	**Grade Level/Course:** Algebra I / CC1	**Duration: 1 periods of 1 (50 minutes) Lesson** **Date:**
Common Core and Content Standards	**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. **A.CED.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non- viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.	
Materials/ Resources/ Lesson Preparation	3c-2 Simultaneous Equations and Inequalities Handout	
Objectives	**Content:** Students are to solve simple system of linear equations given one of the original equations with a solution.	**Language:** Students will be able to communicate (orally, in writing, and through other representations) about concepts, procedures, strategies, claims, arguments, and other information related to problem solving
Depth of Knowledge Level	☐ **Level 1: Recall** ☐ **Level 2: Skill/Concept** ☐ **Level 3: Strategic Thinking** ☐ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☐ **1. Make sense of problems and persevere in solving them.** ☐ **2. Reason abstractly and quantitatively.** ☐ **3. Construct viable arguments and critique the reasoning of others.** ☐ **4. Model with mathematics.** ☐ **5. Use appropriate tools strategically** ☐ **6. Attend to precision.** ☐ **7. Look for and make use of structure.** ☐ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** ☒ **Coherence within and across grade levels** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	
Vocabulary (Tier II or Academic) TEACHER SIMPLE EXPLANATION	**KEY WORDS ESSENTIAL TO UNDERSTANDING**	**WORDS WORTH KNOWING**

			Pre-Image
	STUDENTS FIGURE OUT THE MEANING		
Pre-teaching Considerations			
Lesson Delivery			
Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☐ **Guided Practice** ☐ **Collaboration** ☐ **Independent Practice** ☐ **Guided Inquiry** ☐ **Reflection**		
	Prior Knowledge, Context, and Motivation:		
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**Lesson Overview:** **3c-2 Simultaneous Equations & Inequalities Handout** **Day 1 of 1:** **Preparing the Learner Moment** **20 Minutes** • **Independent Group Effort: Reading Comprehension & Collaboration** • **Mathematical Practice(s) Being Monitored:** 3 Construct viable arguments and critique the reasoning of others: Objective: Mathematical proficient understand and use stated assumptions, definitions, and previously established results in constructing arguments. **Teacher:** Have students work collaboratively in groups in reading, discussing, and answering text-dependent questions on problems 1 (regarding the Mayor). During this time, circulate around the room to provide any clarifications on the questions or how students are to come up with the answer. **Students**: Work collaboratively in answering text-dependent questions. Students are expected to provide 2-3 sentences on the "report to the mayor" explaining how they have arrived to the conclusion. The explanation can be in paragraph forms or in form of a worked problem. **Teacher:** Please use the following support system to help students structure their collaborative effort in working in groups.	**Differentiated Instruction:** **English Learners:** Teacher: Please ensure that students are provided with the linguistic structures to communicate with peers. ○ Clarifying Bookmarks ○ Dyad Share **Students Who Need Additional Support:** Teacher: Please ensure that students are provided with the linguistic structures to communicate with peers. ○ Clarifying Bookmarks ○ Dyad Share

Lesson Continuum

- **Suggested Metacognitive Activity – Clarifying Bookmark I**

Students: Use the following linguistic frames to communicate/explain their understanding with peers.

Accelerated Learners:

What I can do	**What I can say**
I am going to think about what the problem may mean.	*I'm not sure what this is about, but I think it may mean…*
	This part is tricky, but I think it means…
	After rereading this part, I think it may mean…
I am going to summarize my understanding so far.	*What I understand about this problem so far is …*
	I can summarize this part by saying…
	The main points of this section are …

- **Suggested Engagement/Structure of Collaborative Group – Dyad Share**

Agree/Support	**Disagree/Contest**	**Extend/Expound**
13. _____ 14. _____ 15. _____	1. _____ 2. _____ 3. _____	1. _____ 2. _____ 3. _____

Teacher: Once students have finished the two brief reports, have students reflect on the following prompts either individually or in pairs:

- How are those reports related or different? In what way? How did you work out those problems?
- What method did you use to find the answer to the request? How did you use that method?

Students: Are expected to answer system of equations and they used substitution method for this problem.

Students: May use the following structure to help them find the pattern and structure of the problem to draw a conclusion.

- **Triple-Entry Journal**

Part 1 Main Idea	Part 2 Main Idea	My Understanding
What I learned from Part 1 was to _____ _____.	What I did from Part 2 was to _____. Then I did _____.	What I understand from this lesson was to _____ _____.

- **Guided Inquiry to support Generalization & Mathematical Understanding: Communication**
- **Mathematical Practice(s) Being Monitored:**
  6 Attend to precision: precision of algorithm and logic

Teacher: Have students Pair-Share or Group-Share their answers with each other. Then gather students as a large group to draw the answers from each group of students. This is the time where teacher will capitalize on the idea of substitution method in system of equations.

15 Minutes

- **Guided Inquiry to support Generalization & Mathematical Understanding: Collaboration, Critical Thinking and Communication**
- **Mathematical Practice(s) Being Monitored:**
  6 Attend to precision: precision of reasoning and appropriate use of symbols

Teacher: Have students work collaboratively on problems 1 – 4 and support their collaborative conversations by:

- Circulating around the room to provide clarifications from the text/definitions
- Asking leading questions such as
  - "How did the Mayor problems help provide you with methods and strategies to solve these problems?
  - What strategies did you use?
  - How was it used?
  - How did those problems help you with these problems?
  - How did the Think-Pair-Share conversations help you solve these problems? "

Teacher: Have students use the previous examples and definition inform them of these problems.
Students: Use these problems as text-dependent questions to help them trace back in the previous problems to find a strategy for themselves.

	10 Minutes
	Teacher: Have students perform the I-Spy activity to formalize their understanding and skills in solving these problems. See I-Spy structure below for more details.
	• **I Spy** (Send a Spy)
	  ○ When the team is stuck, one student can go around to another team and listen in
	  ○ Student reports back to the team what was learned	

Lesson Reflection		
Teacher Reflection **Evidenced by Student Learning/ Outcomes**		

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3c-2 Simultaneous Equations and Inequalities

1. The mayor of Santa Ana is going on a business trip to Russia. His secretary checked that the average temperature in May in Moscow, Russia is $10℃$. His secretary also gave him the formula to convert ℃ to ℉.

The formula is $F = \frac{9}{5}C + 32$.

The secretary is out sick so your task is to convert the average temperature in May in Fahrenheit and report to the mayor.

Use the following table below to plan and organize your work. **Answer in complete sentences.**

What do you know?	
What are we looking for?	
How many equations are there? *What are they?*	
What do you notice is the same in each equation? *What could you do with the equations?*	

Mathematical Representation of the Problem

$$\begin{cases} C = \_\_\_\_ \\ F = -C + \_\_ \end{cases}$$

$$F = -(\quad) + \_\_$$

What will you report to the mayor?

The mayor of Santa Ana is pleased with your work and has decided to hire you. Your new task is to find the average temperature in Celsius for Santa Ana. The average daily temperature for the month of May in Santa Ana is 77°F.

What do you know?	
What are we looking for?	
How many equations are there? What are they?	
What do you notice is the same in each equation? What could you do with the equations?	

Mathematical Representation of the Problem

$$\begin{cases} F = \_\_\_\_ \\ F = \_\_C + \_\_ \end{cases}$$

What will you report to the mayor?

Definition: A system is two or more equations or inequalities represented by the brace symbol, $\left\{\right.$

For the next two examples use the formula (equation) that converts Celsius to Fahrenheit to create and solve a system of equations.

1. The boiling point of water is 100°C. Find the boiling point of water in degrees Fahrenheit.

$$\begin{cases} C = \_\_\_\_ \\ F = -C + \_\_ \end{cases}$$

2. Water freezes at 32°F. Find the freezing temperature in degrees Celsius.

$$\left\{\right.$$

3. Solve the following system of equations

$$\begin{cases} 3x + 2y = 8 \\ x = 7 \end{cases}$$

4. Solve the following system of one inequality and one equation

$$\begin{cases} 3x - 4y \leq 24 \\ y = 3 \end{cases}$$

Looking back to the definition box and examples 1 to 4, redefine systems of equations (inequalities) in your own words.

_____

_____

What is the symbol used to group the equations (inequalities) of a system?

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SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: 3 **Lesson:3c-3**	**Grade Level/Course:** Algebra 1	**Duration: 2 of 2 (50 Minutes) Lessons** **Date:**
Common Core and Content Standards	**A.CED.1** Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. **A.CED.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non- viable options in a modeling context.	
Materials/ Resources/ Lesson Preparation	3c-3 Simple Interest Student Handout	
Objectives	**Content:** All students will be able to solve for solve single variable systems given information hidden in text, specifically simple interest problems.	**Language:** All students will be able to dissect complex text and have a thorough understanding of high level terms such as initial balance and principal as well as participate in high level discussions.
Depth of Knowledge Level	☒ **Level 1: Recall** ☒ **Level 2: Skill/Concept** ☒ **Level 3: Strategic Thinking** ☒ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☒ **1. Make sense of problems and persevere in solving them.** ☐ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☐ **4. Model with mathematics.** ☒ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☐ **7. Look for and make use of structure.** ☐ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** ☐ **Coherence within and across grade levels** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	
Vocabulary (Tier II TEACHER SIMPLE EXPLANATION	**KEY WORDS ESSENTIAL TO UNDERSTANDING**	**WORDS WORTH KNOWING**

	STUDENTS FIGURE OUT THE MEANING	• Simple interest • Interest • Rate • Initial balance • Principal	• Elapsed • Periods
Pre-teaching Considerations			

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☐ **Guided Practice** ☐ **Collaboration** ☐ **Independent Practice** ☐ **Guided Inquiry** ☐ **Reflection**
	Prior Knowledge, Context, and Motivation: All students will need to know how to • Solve for a specific variable • Read and interpret complex text • Use given formulas to solve single variable equations(specifically Simple interest)

Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**Lesson Overview** **3c-3 Simple Interest Handout** **Day 1 of 2:** • **Independent Group Effort: Reading Comprehension & Collaboration** • **Mathematical Practice(s) Being Monitored:** 3: Construct viable arguments and critique the reasoning of others 1: Make sense of problems and persevere in solving them Objective: Students will analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of other students. Students analyze givens, constraints, relationships, and goals and make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. • Independent and group work. • Math talk • Close read • Pair share • Agree/ Disagree **10 minutes - Math talk** **Teacher-** Engage students in a discussion about what interest means.	**Differentiated Instruction:** **English Learners:** **Students Who Need Additional Support:** Write all student ideas about interest during Math Talk on board. Watch students closely during close read activity. Write sentence frames on board. Some students may want

Lesson Continuum

	Possible questions to guide the math talk could be? • What does the word mean? • How is it used in math? • Are there different types of interest? **Students**- Students should lead the discussion but need to be patient and follow established courtesy rules. This activity should be student driven **35 minutes -Close read activity** (students will be reading this passage two times) At all times during this activity the teachers primary role is to walk the room and facilitate learning and guide the conversations, but not explicitly provide new information **Teacher**- FIRST READ: Have the students read the provided paragraphs on interest and circle words they do not understand. (from *"Interest is a fee… to … number of periods mt"*) **Students-** During the first read students should read the 3 paragraphs and circle all the words you do not understand. **Teacher-**After 5 minutes tell students to "partner with your shoulder partner and share/ discuss the words you don't understand, and write down the words that are still unclear after sharing on a sticky note" **Students-** Students should be discussing and writing unknown words **Teacher-**After 5 minutes of discussion the teacher should prompt students to present the unknown words, or symbols, to the class for discussion and clarification. (optional) If your class is less likely to openly share the words you can walk around and collect the sticky notes, write the words on the board and ask the class for help defining the words. <u>Key point: Make sure students recall/ understand that the information given within the brace represents a system of single variable equations.</u> **Students-**It is the students responsibility to have a quality discussion and help define unclear words **Teacher-**SECOND READ: Once all students have an understanding of the vocabulary have the class reread the text and underline what they think is the most important information, allow 5 minutes. **Students-**Once all students have reread the passage have students pair up with a new shoulder partner to discuss the meaning of the text and allow 5-7 minutes for conversation. **Teacher**- Finally allows students to independently answer questions 1-4 at the bottom of page 19. **Students-** Students should be filling in the answers independently on page 19	problems on p. 20 to be read aloud . Remind students for Problem 3 on p. 21 that they can use the formula I=rBm and get any variable in the equation by itself to solve. **Accelerated Learners:**

AGREE/ DISAGREE activity

Teacher- After 5 minutes for response writing, have students form groups of 4 and discuss their answers. There is a provided sentence frame for students to use during this activity.

Students: Students who disagree with an answer should raise their hand and begin their response with "I disagree with their answer because according to the text….."

Teacher- Once all groups have had a chance to discuss their answers the teacher should choose four groups to each give an answer for one of the 4 questions.

After each group presents give the class an opportunity to disagree, if no one disagrees move on to the next question (it is the responsibility of the teacher to facilitate the responses and direct thinking in the correct direction)

Given/ Want to find

20-30 minutes

With the remaining 20-30 minutes have all students move on to question 1 on page 20

Teacher-First have students independently read the question to themselves twice.

The first time they read the question they should be taking notes on what they know about the problem. (i.e. the interest is 18%)

The second time they read they should be realizing that what the question is asking of them. (i.e. what is the interest owed and what is the new balance?)

Student- During this time students are working on their own to create a chart of what they are given and what is missing.

Teacher- After 5 minutes of reading and writing the teacher should ask the class leading questions about

1. What do we know?
2. What does the question want us to find?
3. What is this problem about?
4. What could we use to solve this problem?

(Caution: Do not directly ask questions 3 and 4 but try to get students to develop the idea on their own)

With the remaining time have students return to their groups of 4 to work on the problem together. It is the teacher's responsibility to facilitate the discussion and group work but not give answers.

Closure for day 1:

5 minutes

Teacher: Have a class discussion about what answers were discovered.

(If multiple answers were found have students representing each group come to the board and explain their reasoning)

	Make sure that before the close of class there is an understanding of what the right answer is **Students:** During this time students should politely wait and respond with hand raising after each comment **Day 2 of 2:** • **Independent Group Effort: Reading Comprehension & Collaboration, Paired and Independent Work** • **Mathematical Practice(s) Being Monitored:** 6: Attend to precision 1: Make sense of problems and persevere in solving them Objective: Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. Students will analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of other students. **10 minutes** **Teacher-**Begin class by having students recall and make a list of five things they learned yesterday Spend 5 minutes discussing the student's thoughts and suggest reminders on any terms or concepts that had not been mentioned. • Simple Interest • Principal/ initial balance • Rate • Percentage • System of equations • Periods **Students-** Students should be leading the conversation and giving ideas while the teacher writes them on the board as a list **Problem 2 page 20** **25 minutes** **Teacher-** Now have students partner-up to work on problem 2 on page 20 1. After 5 minutes have a student comes to the doc cam to fill in the brace/ system of equations. 2. After 10 minutes have a student come to the front to explain why they are using the simple interest equation and fill in the components 3. After 10 minutes have a third student come up and demonstrate how to solve for the new interest and the new balance. **Student-** Students should be working with their partners at this time	

	Problem 3 page 20 **25 minutes** **Teacher-** Have students read problem 3 independently for the given and missing information. **Students-** Students should make a chart of the given and missing information and then build a system of equations. **Teacher-**After 10 minutes have students form groups of 4 and present their systems one at a time to the other members of the group. **Students-** When presenting the systems of equations students should not be providing feedback. Once all students have presented then students should have a discussion about the different systems and come to an understanding of what is right or wrong. **Teacher-** After 10 minutes of discussion have one student come present their system. After the student presents have all groups work together to complete problem 3. **Students-** At this time all students should be contributing to their group and providing input **Closure:** Collect page 21 from each student to check for understanding for the day.	
Lesson Reflection		
Teacher Reflection **Evidenced by Student Learning/ Outcomes**		

3c-3 Simple Interest

The following text is from Wikipedia.org about **simple interest**. Read and analyze the text before answering the questions below.

Interest is a fee paid by a borrower of assets to the owner as a form of compensation for the use of the assets. It is most commonly the price paid for the use of borrowed money,[1] or money earned by deposited funds.[2]

When money is borrowed, interest is typically paid to the lender as a percentage of the principal, the amount owed to the lender. The percentage of the principal that is paid as a fee over a certain period of time (typically one month or year) is called the interest rate. A bank deposit will earn interest because the bank is paying for the use of the deposited funds. Assets that are sometimes lent with interest include money, shares, consumer goods through hire purchase, major assets such as aircraft, and even entire factories in finance lease arrangements. The interest is calculated upon the value of the assets in the same manner as upon money.

Simple interest

Simple interest is calculated only on the principal amount, or on that portion of the principal amount that remains unpaid.

The amount of simple interest is calculated according to the following formula:

$$I_{simp} = r \cdot B_0 \cdot m_t$$

where r is the period interest rate (I/m), B_0 the initial balance and m_t the number of time periods elapsed.

To calculate the period interest rate r, one divides the interest rate I by the number of periods m_t.

1. What does the letter $\boldsymbol{I}$ in the formula represent?

2. What does the letter $\boldsymbol{r}$ in the formula represent?

3. What does the letter $\boldsymbol{B_0}$ in the formula represent?

4. What does the letter $\boldsymbol{m_t}$ in the formula represent?

1. Uncle Sam's family has an outstanding credit card balance of $5,000. His credit card has an annual simple rate of 18%. If he did not make any payments for 3 years, how much interest would he owe? What will the new balance be?

Create and solve a system of equations to represent this problem.

$$\begin{cases} \mathrm{I} = \\ r = \\ m_t = \\ B_0 = \end{cases}$$

2. You are off to college and you need a car to get to class and work. You decided to borrow money from the bank at a simple interest rate of 8% for 4 years. The car you bought costs $_____

Calculate the interest rate on the loan.

3. While in college you bought a computer that cost $1,400. You bought the computer using your parent's credit card when you were 18 years old. On your 28th birthday your parents tell you that you owe them $2,240.

How much interest (in dollars) has been added to the original cost?

How much time has passed (in years)?

Create and solve a system of equations to find the interest rate:

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SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: A3 **Lesson:** **A3-SA-1**	**Grade Level/Course:** Algebra I / CC1	**Duration: 2 periods of 2 (50 mins) Lesson** **Date:**
Common Core and Content Standards	**A.CED.1** Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. **A.CED.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non- viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods. **A.CED.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R. **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. **A.REI.2** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. **A.REI.11** Explain why the x-coordinates of the points where the graphs of the *equations* $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.	
Materials/ Resources/ Lesson Preparation	Summative Assessment Handout	
Objectives	**Content:** Students are to demonstrate the ability of modeling with Mathematics by modeling the given non-routine options using the mathematical models of equations & inequalities to solve the problem; then they are to use their algebra skills to compute and make sense of the answer with the given problem.	**Language:** Students are to perform a close read, collaborate with others in communicating the mathematics behind each Option. Students are to display their reasoning via written communication.
Depth of Knowledge Level	☒**Level 1: Recall** ☒**Level 2: Skill/Concept** ☒ **Level 3: Strategic Thinking** ☒ **Level 4: Extended Thinking**	

Standards for Mathematical Practice	☒ **1. Make sense of problems and persevere in solving them.** ☐ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☒ **4. Model with mathematics.** ☐ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☐ **7. Look for and make use of structure.** ☐ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** ☒ **Coherence within and across grade levels** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	
Academic Vocabulary (Tier II & Tier III) — **PROVIDES TEACHER SIMPLE EXPLANATION**	**KEY WORDS ESSENTIAL TO UNDERSTANDING**	**WORDS WORTH KNOWING**
		Boat rental Illustrate Assume
STUDENTS FIGURE OUT THE MEANING		Passengers
Pre-teaching Considerations	N/A	
Lesson Delivery		
Instructional Methods	**Check method(s) used in the lesson:** ☒ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☐ **Independent Practice** ☐ **Guided Inquiry** ☒ **Reflection**	
	Prior Knowledge, Context, and Motivation: One variable inequality Graphing & solving one variable inequality	
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**Lesson Overview** **Day 1 of 2:** **Teacher:** Hand out the Summative Assessment. Have students work either in pairs or groups of four. Let students know that the reasoning must be in place for each option.	**Differentiated Instruction:**

Lesson Continuum

Students are to collaboratively work on these problems using the following Dyad Share structure to discuss the reasoning. Students can be given the following frames to have conversations with their partner: I agree/disagree with _____ because _____.

Dyad Share Structure:

Agree/Support	Disagree/Contest	Extend/Expound
16. _____ 17. _____ 18. _____	1. _____ 2. _____ 3. _____	1. _____ 2. _____ 3._____

Teacher: may find that students have an easier time working and explaining their reasoning for Option 1 since the problem requires 1-variable equation and inequality concepts and skills (computational and graphical). Teacher may find students struggle with Option 2 since it involves 2 equations/inequalities and 2 variables. However, teacher could provide the following leading questions to help students overcome the challenge.

Option 2: Suggested Questions:

1. How is Option 2 different from Option 1? In what way?
2. How many different "unknowns" are there for Option 2 as opposed to Option 1? How does that help you think about the number of equations/inequalities needed in order to solve?
3. How many different approaches can you use in order to solve Option 2? Table? Possible combination of adults and children? Can we draw a connection between the combination of people and the total weight? How does that play out on algebraically? Graphically?

Day 2 of 2:

Teacher: Once all students are done with their work, have each group display their "most proud of" solved problem/level on chart paper for a Gallery Walk. See Gallery Walk structure below for more information.

Gallery Walk Structure:

- Each group will display their poster
- Each group selects a group member to be the docent to answer questions or provide clarifications/explanations
- The other group members examines, explores, reviews the other groups' posters
- There will be time for each group to re-assemble and discuss the information shared in the groups' posters
- Please remind gallery walk norms and be respectful of the work and information shared.

Teacher: Please assign tasks for the rest of the team to pay attention to while performing the walk. Assign a purpose for each observant. Prompts: Student 1: What is a method that is found common across teams? Student 2: What is a unique method that is very different from the rest of the team? Student 3: Pick one method/poster that gives a different answer from yours. Evaluate that method in comparison to yours.

English Learners:

Students Who Need Additional Support:

Accelerated Learners:

	Feedback: **Teacher:** If time allows, please provide the feedback on Option 2 and go over the final question in comparison of the two options. This is the opportunity to teach the untaught in order to improve students' mathematical reasoning and algebraic skills. **Question:** Compare the two options. a. How are these two options different or alike mathematically and graphically? b. How was your approach to one option different from the other? Explain. If you were to pick one option for your family, which option will you go for? Explain.	
Lesson Reflection		
Teacher Reflection **Evidenced by Student Learning/ Outcomes**		

Summative Assessment **Name _____**

Direction: You are to work on this Assessment with a partner.

Fishing Adventures rents small fishing boats to tourists for day long fishing trips. There are two options for boat rentals that you need to consider in order to choose the appropriate boat for your group.

Option 1: (Adults only)

Each boat can hold at most 1200 pounds of people and gear for safety reasons. Assume on average an adult weights 150 pounds and are allowed to have 15 pounds of gear each. Also assume each group will require 200 pounds of gear.

Question: How many adults are allowed on the boat? Illustrate your reasoning algebraically and graphically by providing

b. An inequality that represents the weight limit and the total of passengers allowed on the boat
c. A solution set to the inequality on a number line or coordinate plane.

Option 2: (Family)

Each boat can hold at most eight people. Additionally, each boat can only carry 1200 pounds of people and gear for safety reasons. Assume on average an adult weighs 150 pounds and a child weighs 75 pounds. Also assume each group will require 200 pounds of gear plus 10 pounds of gear per person.

Question: How many adults and children are allowed on this boat in order to optimize the weight limit? Illustrate your reasoning algebraically and graphically by providing

a. An inequality or system of inequalities that represent the weight limit and the total number of passengers allowed on the boat.
b. A solution set to the inequalities on coordinate plane.

Question: Compare the two options.

c. How are these two options different or alike mathematically and graphically?
d. How was your approach to one option different from the other? Explain.
e. If you were to pick one option for your family, which option will you go for? Explain.

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