

8th Grade Math: Solving Multi-step Equations Lesson Plan

This lesson should take place after students have had practice solving single step equations involving adding, subtracting, multiplying, and dividing to solve for the unknown variable.

In this lesson, students will conceptualize the process of solving multi-step linear equation by representing variables and constants on a balance.

Lesson Plan (90 minute class period - can also be done as two 50 minute lessons)

Topic: Solve multi-step equations with variables on both sides	Class: 8th Grade Math	Date:
Common Core Standard: CCSS: 8.EE.7b: Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.		
CCSS Math Practices: MP1: Make sense of problems and persevere in solving them. MP3: Reason abstractly and quantitatively MP4: Model with mathematics. MP6: Attend to precision. MP7: Look for and make use of structure.		
Key Vocabulary: Inverse operation, isolate, variable, constant, reciprocal, coefficient, isolate variable	Materials <ul style="list-style-type: none">● ChromeBooks● Access to PhET Equality Explorer● Access to Schoology● Pencil● Activity Handout	
Learning Goals: <ul style="list-style-type: none">● Students will show proficiency in solving multi-step equations with variables on both sides.● Students will apply inverse operations to solve equations● Students will be able to justify their solution process, in writing, and in peer discussions		
Prior Knowledge <ul style="list-style-type: none">● Solving one-step equations using addition and subtraction and● Solving simple equations using multiplication or division. Now students will learn how to solve multi-step equations.		

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Time	Activity	Notes
0:00 - 10:00	Warm- up	<p>(You can make individual copies or project it on the overhead)</p> <p>Students work for 4 minutes silently on the warm-up. Students then discuss strategies they used to find the number of coins in each pouch with their partner / table group for 3 minutes. Students share out various strategies as a whole class for 3 minutes</p> <p><i>Teacher will walk around and help students who are having difficulty getting started, by asking guiding questions:</i></p> <p><i>What does equality mean?</i> <i>How can we maintain equality?</i> <i>How do you know if your answer is correct?</i></p>
10:00 - 20:00	Explore the Sim	<p>Students pick up their chromebooks and log in</p> <p>Students go to Equality Explorer Sim</p> <p>Students explore the simulation and play around with the various tools in the simulation.</p> <p><i>Teacher will help students having difficulty getting on to the Sim, encouraging them to look at the different options and tools available.</i></p>
20:00 - 25:00	Share observations about the Sim	<p>Students share out things they noticed while playing around with the Sim.</p> <p>Students come up to the projector to show discoveries that they made while exploring the Sim</p>
25:00 - 35:00	Activity 1 Basics Tab	<p>Individual work: Students explore the Basics tab to get familiar with what makes the pans balance. Students compare quantities and write mathematical statements to show how the weights of two objects relate to each other</p> <p><i>Teacher will help students by asking questions like:</i> <i>What do you notice about...?</i> <i>What do you think will happen if...?</i></p>
35:00 - 55:00	Activity 2 Operations Tab	<p>Partner Work: Students pick up a set of equations from the teacher. They take turns setting up the problem on the Operations tab, locking the problem, and asking their partner to solve. Students end the activity by creating their own problems for their partner to solve, recording steps they took to create the problems</p> <p>Note: Students will not write on this sheet. You can make a classroom set and reuse it for other sections.</p>

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		<p><i>Teacher will help students having difficulty setting up problems.</i></p> <p><i>Teacher will ask guiding questions like:</i></p> <p><i>Why did you choose this step to do first?</i></p> <p><i>Why does it make sense to you?</i></p> <p><i>Could you have started with a different step? Do you think it will change your answer? How do you know?</i></p>
55:00 - 60:00	Brain Break	
60:00 - 80:00	Activity 3 Solve It Tab	Individual or Partner Work: Students play games at various levels in the solve it tab - either individually or with a partner.
80:00 - 90:00	Summarize Exit Ticket	Have students share steps they used to solve equations with variables on both sides. Did anyone use a different method? Will you end up with the same answer? Why or Why not? Individual Work: Students identify errors in a couple of problems involving solving multi-step equations and try and fix those errors.