Video Links: 6th Grade Math Lesson on Solving Algebraic Equations
Lesson Objective: Solve algebraic equations and determine if a given number makes an equation true.
Compass Component and Rating: Questioning and Using Discussion Techniques (3b), *Effective Proficient;* Engaging Students in Learning (3c), *Effective Proficient*

Common Core State Standard(s)
CCSS.Math.Content.7.EE.B.4a: Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*

Compass Component 3b: Questioning and Using Discussion Techniques (Rating: *Effective Proficient*)		
Indicators	**Evidence**	**Common Core Connection**
Teacher uses open-ended questions, inviting students to think and/or have multiple possible answers.	• Teacher uses open-ended questions such as, *"Why did we choose to add eight?"* (3:20) and *"Why do you think you can take out Sadie?"* (6:18) to encourage students to explain the processes they used to complete a particular step. • To increase the quality of the equation presentations and class discussion, the teacher asks a group, *"What are some of the questions you might ask your classmates?"* (7:52) This requires students to think critically about their presentation and the discussion they will lead about their original equation.	CCSS.Math.Content.7.EE.B.4a Students work together to solve two-step equations. Through 'Human Equations' they identify the sequence of operations needed to isolate the variable and determine the answer. Teacher asks students to explain their reasoning regarding the sequence of operations and demonstrate understanding by creating an original two-step equation for the class to solve. CCSS.Math.Practice.MP1 As students work through each step of the equation, they make sense of the problem and analyze it for potential solutions.

The teacher makes effective use of wait time.	• When a student answers a question incorrectly, the teacher uses wait time to allow the student to revise her answer. The student says, *"One…two".* (1:57) The teacher does not say anything after the student's incorrect answer, allowing her to self-assess her accuracy.	CCSS.Math.Practice.MP3 As students discuss the process of solving the equation with their classmates, they form arguments about why they performed a particular action or mathematical step.
Many students actively engage in the discussion.	• The majority of the students in the classroom have a card for the human equation (1:27), allowing them to physically engage in the lesson.	

Compass Component 3c: Engaging Students in Learning (Rating: *Effective Proficient*)		
Indicators	**Evidence**	**Common Core Connection**
Students have some choice in how they complete learning tasks.	• When working in small groups, students can choose the role they play within their groups. (6:36) • Students can choose the equation that they present to the rest of the class to solve, creating an original equation based on their content understanding. (7:19)	
Materials and resources support the learning goals and require intellectual engagement, as appropriate.	• The creation of a human equation (2:18) and use of cards to represent each of the steps supports the objective and allows students to see and discuss the processes with their peers in a clear manner.	
There is a mix of different types of groupings, suitable to the lesson objectives.	• Students work as a whole-class (3:00) during the modeling of the first 'Human Equation', then work in small groups (7:30) to develop their own equation.	
Learning tasks have multiple correct responses or approaches and/or	• Explanation of the sequence of operations (3:20) involves higher order thinking.	

demand higher-order thinking.	• There are numerous ways that students can create an original 'Human Equation' to present to the class. (9:00) Requiring students to create an original equation for the class to solve is valuable because it asks students to engage higher-order thinking as they apply the content they have learned and provides additional student-centered practice for the class. The teacher can also use it as an assessment to identify gaps in student understanding.	

WHAT COULD THIS TEACHER DO TO IMPROVE?

What did the teacher do in this lesson?	*Highly Effective* Indicators	What could the teacher do to move to *Highly Effective*? (example actions)	How could this lesson be improved for students to meet Common Core standards?
The discussion of the human equation steps are teacher-centered, with students answering the questions posed by the teacher.	Students initiate higher-order questions. (Questioning – 3b)	Allow students to take turns leading the discussion/solution of the equation. Provide them with 5 minutes to prepare higher-order questions to ask their classmates when working toward a solution.	Incorporation of word problems into student work or the 'Human Equations' would increase the alignment of this lesson with CCSS.Math.Content.7.EE.B.4a. Additionally, asking students to compare the algebraic solution to a numerical solution of the word problems would address all elements of the standard.
During group presentations, only one member of the group asks questions to the class. While students are working though the Human Equations, most students are sitting idle in their seats,	Virtually all students are highly engaged in the lesson. (Engaging – 3c)	Provide students with a format for completing the problems at their seats while the Human Equations are being solved. Students could work on white boards and check their work against the Human Equation. Alternately, students could use a graphic organizer or guided notes to track the steps used to	

waiting for their turn.		isolate the variable in the equation. This would increase the engagement of students who don't have a direct role in the equation and reinforce content through additional practice.	

*Although this video is of a 6th grade class, the class is working on 7th grade standards.