Distributive Property Review

Overview

Learning goal:
- Demonstrate the ability to use the distributive property with expressions accurately
- *Levels of Mastery*
  - 5 (Advanced)- I can distribute and simplify expressions that are 1x3 or 2x2 in length. I accurately combine like terms and pay attention to signs. I can teach this to someone.
  - 4- I can distribute and simplify expressions that are 1x3 or 2x2 in length. I accurately combine like terms and pay attention to signs. I know this but I am unsure if I can teach this at this point.
  - 3 (Target)- I can distribute and simplify expressions that are 1x2 in length. I accurately combine combine like terms and pay attention to signs.
  - 2- I can distribute and simplify expressions that are 1x2 in length. I can accurately combine like terms that have positive integers in them.
  - 1 (Needs Help)- I do not understand how to use the distributive property yet.

Common Core Standards:
- CCSS.MATH.CONTENT.6.EE.A.3

Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*

- CCSS.MATH.CONTENT.8.EE.C.7.B (taught as a review so this is approachable)

Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Mathematical Practices
- 2) Reason abstractly and quantitatively
- 4) Model with mathematics
- 6) Attend to precision

Materials
- Computers for student use
- PhET simulation "Area Model Algebra"
- Distributive Property Activity Sheet

Estimated Time: Approximately 45-50 minutes

Distributive Property Review

Warm Up - 5 min max

Students will:	Teacher notes:

Students will review an elementary version of the distributive property by seeing how the answers to these three questions are the same, just done differently.

- Multiply 4(12)
- Multiply 4(10 + 2)
- Multiply 4(8 + 4)

Warm Up can be skipped to provide more time for discussion at the end. The explore activity provides much of this front loading as well.

Simulation Introduction - 5 minutes

Teacher will:	Student will:
- Ask a student to distribute the activity sheet - Ask students to find the simulation -- Area Model Algebra - Encourage students to explore the "Explore" part of the simulation paying particular attention to what each of the buttons does and how they would be useful. **Circulate** around the room and ask them any of the following: - Is there a way to see what is going on inside the boxes? - Is there a way you can see the work that is being shown? - What happens when you move the blue or red arrow all the way to the side? - How does changing the size of the total area change the dimensions? - Have you tried playing with any of the other size dimensions? How does that change the problem? - Stop students after 5 minutes of exploration for class discussion.	- Play and explore the simulation - Pay attention to each of the buttons and what they do.

Class Discussion 10 minutes

Teacher will:	Student will:
Two big ideas to bring out in this time 1. Buttons - It is important to stress the importance of certain buttons for today's lesson. Those buttons are the partial products "a x b" button and the area model calculation 3rd button (the all blackened graph). These two buttons will allows students to see what is going on inside each of the partial products and let them see how to show their work correctly. Have students show these buttons. Another button that you want to make sure the whole class understands is how to change the dimensions to 2x2. 2. How to show your work on the activity sheet. So, as a class "we do together", show them how to enter the answer to 4a. The activity sheet was meant to have students write the dimensions in the model but if it is too small they can write them above the total area. Here they are to show the dimensions, show the product, and then how to show the	Show what the buttons do to the whole class and why these buttons are important. Students are to copy the example of how to show the product and the work needed to answer the total area below.

work correctly all the way down to the total area box below.	
Guided Exploration 15 minutes	
Teacher will:	Student will:
- Ask students to answer questions 4 through 6 in the activity. - Question 6 is meant more of an extension problem and if students do not get to this that is ok. Remember, the goal is to review the distributive property and not to introduce multiplying binomials. - Circulate around the room helping students see the partial products and how to show their work. - For struggling students during question 4 ask - When you multiply the two numbers what number should you expect to see in the partial product? - For students struggling with the product of 4 and x, If you have a group of 4 and they are students, what do you have? This applies to x's...if you have 4 x's what do you have? - For struggling students during question 5 ask: - What number goes into both of the coefficients of the total area? - Are there other numbers that could possibly work? - Have you tried negative options? - Question 6 (2x2 dimensions) - Students will need to see that in this example they will have to combine like terms.	- Complete questions 4-6 on the activity sheet. - Complete the discussion questions. If time permitting, discuss your answers with a peer. - Play Levels 1-3 on the Area Model Algebra game. - Be able to explain why the 2 x 2 model requires additional steps to complete. - Ask clarifying questions.
Discussion and Summary 10 minutes	
Teacher will:	Student will:
- Facilitate discussions concerning: - If dimensions change why does the entire area not change? - Try drawing 5(x +2) = 5x + 2. What do you notice? What do you think happened? - What is the relationship between distributing and factoring? - What are common mistakes students make when distributing? Would using a 1 x 2 area model to help you distribute help alleviate this common mistake?	- Engage in the discussions referring back to their discussion answers. - Ask clarifying questions
Going Forward...	
Teachers can refer students to the Area Algebra Model as they introduce students to solving equations requiring distribution.	

[Student Activity Sheet](#)