Sharing is Caring
Distributive Property

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Grade Level	7th – 9th Grade	**Time Frame**	1-2 class period(s)
Subject	Mathematics	**Duration**	60 minutes
Course	Middle School Mathematics		

Essential Question
How do you use the distributive property to evaluate and simplify expressions?

Summary
This lesson focuses on the importance of understanding how to use the distributive property to correctly solve expressions. Students will use different foods that make up a meal to demonstrate use of the distributive property and in conjunction with order of operations, simplify expressions. Next, students will use dice to create, solve, and discuss randomized equations. Then, each student will create their own equation and food sharing scenario and solve classmates' equations using the distributive property.

Snapshot

Engage
Students analyze a real-world scenario involving distributing food equally to their friends.

Explore
Students use dice as a randomizer to create unique equations and better understand the distributive property.

Explain
Students discuss their own understanding with a partner to check for accuracy and clarify misconceptions.

Extend
Students create their own real-world distributive property scenario by formulating a fast-food combo meal with its own equation.

Evaluate
Students solve their peers' scenarios with a Gallery Walk.

Standards

Oklahoma Academic Standards for Mathematics (Grade 7)

7.A.4.1: Use properties of operations (limited to associative, commutative, and distributive) to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number exponents.

Oklahoma Academic Standards for Mathematics (Grade 7)

PA.A.3.2: Justify steps in generating equivalent expressions by identifying the properties used, including the properties of operations (associative, commutative, and distributive laws) and the order of operations, including grouping symbols.

Attachments

- Combo-Meal-Gallery-Walk-Journal-Sharing-Is-Caring - Spanish.docx
- Combo-Meal-Gallery-Walk-Journal-Sharing-Is-Caring - Spanish.pdf
- Combo-Meal-Gallery-Walk-Journal-Sharing-Is-Caring.docx
- Combo-Meal-Gallery-Walk-Journal-Sharing-Is-Caring.pdf
- Create-a-Combo-Meal-Sharing-Is-Caring - Spanish.docx
- Create-a-Combo-Meal-Sharing-Is-Caring - Spanish.pdf
- Create-a-Combo-Meal-Sharing-Is-Caring.docx
- Create-a-Combo-Meal-Sharing-Is-Caring.pdf
- Dice-Table-Sharing-Is-Caring - Spanish.docx
- Dice-Table-Sharing-Is-Caring - Spanish.pdf
- Dice-Table-Sharing-Is-Caring.docx
- Dice-Table-Sharing-Is-Caring.pdf
- Dinner-Plates-Handout-Sharing-Is-Caring - Spanish.docx
- Dinner-Plates-Handout-Sharing-Is-Caring - Spanish.pdf
- Dinner-Plates-Handout-Sharing-Is-Caring.docx
- Dinner-Plates-Handout-Sharing-Is-Caring.pdf
- Distributive-Manipulation-Explore-Cards-Sharing-Is-Caring - Spanish.docx
- Distributive-Manipulation-Explore-Cards-Sharing-Is-Caring - Spanish.pdf
- Distributive-Manipulation-Explore-Cards-Sharing-Is-Caring.docx
- Distributive-Manipulation-Explore-Cards-Sharing-Is-Caring.pdf
- Distributive-Manipulation-Explore-Extended-Sharing-Is-Caring - Spanish.docx
- Distributive-Manipulation-Explore-Extended-Sharing-Is-Caring - Spanish.pdf
- Distributive-Manipulation-Explore-Extended-Sharing-Is-Caring.docx
- Distributive-Manipulation-Explore-Extended-Sharing-Is-Caring.pdf
- Lesson-Slides-Sharing-Is-Caring.pptx

Materials

- Lesson Slides (attached)
- Dinner Plates handout (attached; one per student)
- Distributive Manipulation Explore Cards (attached; one per pair)
- Dice Table handout (attached; one per student)
- Polyhedral dice in various colors (six-, eight-, ten-, twelve-, and/or twenty-sided dice) (three dice per pair of students)
- Distributive Manipulative Explore Extended cards (optional; attached)
- Create a Combo Meal handout (attached; one per student)
- Combo Meal Gallery Walk handout (attached; one per student)

Engage

Use the attached **Lesson Slides** to guide the lesson. Begin by introducing the title on **slide 1.** Review the Essential Question on **slide 2**, then move to **slide 3** and read aloud the following scenario: You have invited two of your best friends over for dinner. The dinner consists of their favorite foods: pizza, strawberries, cookies, and lemonade. They are running late, so you decide to make their plates for them. Pass out the attached **Dinner Plates Handout**. Give students enough time to draw their explanations. Then, move to **slide 4** and introduce an Elbow Partner to have students confer with each other and answer the questions on the slide:

1. What did you put on each friend's plate?
2. How can you ensure that the food is distributed fairly?

Possible Student Responses: Student Conversations

Students should mention that the fairest way to fill both plates is to serve the same amount of food for each friend. After partner discussions, tell students about the distributive property and how it aligns with the same principle of fairness, as it "serves" the same action to every number inside the parentheses of an expression.

Explore

Teacher's Note: Preparation

Before beginning the Explore phase, print out a copy of the attached **Distributive Manipulation Explore Cards** for each student. If you want your students to solve these problems in order, use the handout as-is. Or, you may randomize the expressions by cutting each handout in half to separate the equations, then having students solve them in random order.

Have students work in pairs. Pass out a copy of the attached **Dice Table handout** to each student, as well as the **Distributive Manipulation Explore Cards**. Give each pair of students three polyhedral dice—two dice of the same color and the third of a different color. The different colored die represents a negative number. Ask one student in each pair to go first. This student should begin with the first equation on the Distribution Manipulation Explore Cards (or the first strip, if the cards are halved and being solved in random order). Move to **slide 5** and ask students to follow the steps on the slide:

1. Roll a polyhedral die. Place the resulting number in the first slot of the equation.
2. Roll a different polyhedral die. Place the resulting number in the second slot.
3. Roll the last polyhedral die. Place the resulting number in the third slot.

Ask both students in each pair to write this randomized equation down on their Dice Table handouts, under the "Student #1" column in the first row. Then, ask each pair to work together to simplify the problem. Allow enough time for each pair to finish.

Explain

Move to **slide 6**. Ask each pair to look at their equation and solution. Are they confident in the answer? Ask students to help one another clarify misconceptions about how the expression can be solved by asking the following questions:

- How did you solve the problem?
- You used a specific method. What would happen if you tried to solve it in a different way?
- What do you still not understand?

Once both students have agreed that their solution is correct, ask them to switch roles and repeat the process. The second student in each pair should follow the same directions given in the Explore phase to generate a randomized equation with the pair's dice, and both students should write the new equation on their Dice Table handouts under the "Student #2" column in the first row. Each pair should then simplify their problem and evaluate their answer, clarifying misconceptions.

Repeat this process until each group member has generated four problems each, with a total of eight equations and solutions per pair.

Optional: Extended Distributive Manipulation

Some students may quickly grasp how distribution works. You may choose to make this activity more challenging. You can do this by cutting the Distribution Manipulation Explore Cards in half (if you have not already done so) and cutting out the equation symbols in the attached **Distributive Manipulation Explore Extended**. Have students randomly draw a number of equations and plus or minus symbols, placing the plus or minus symbols between equations to create a much longer equation to simplify. If, for your class, this lesson is a review of two-step equations, give the students an (=) sign and another die, so that they can then solve the equation.

Once the students solve eight problems each and discuss, return to the class as a whole. Move to **slide 7**. Ask the class to walk you through the process of applying the distributive property, step-by-step, using the processes they have formulated themselves. Consider writing the steps students suggest for you on the slide, or on a whiteboard space. Ask students to help you understand the importance of using the distributive property correctly.

Move to **slide 8**. Challenge students with the equation on this slide. Use their answers to check their understanding of the concept before moving forward. Clarify any misunderstandings.

Optional: Adding Additional Problems

If you so choose, you can add additional slides with additional problems to foster further understanding.

Extend

Move to **slide 9**. Ask the students the following question: *When you order fast food, is it cheaper to buy items separately, or together in a combo meal?*

Let students discuss their thoughts. Then, move to **slide 10**. Pass out the attached **Create a Combo Meal** handout. Ask students to come up with a scenario for their classmates to solve, similar to the one pictured on slide 10 (and below). Then, invite students to write their own scenarios and draw a corresponding picture on the handout.

CREATE A COMBO MEAL EXAMPLE

Maria wants three combo meals that consist of two burgers, two fries, and one ice cream cone.
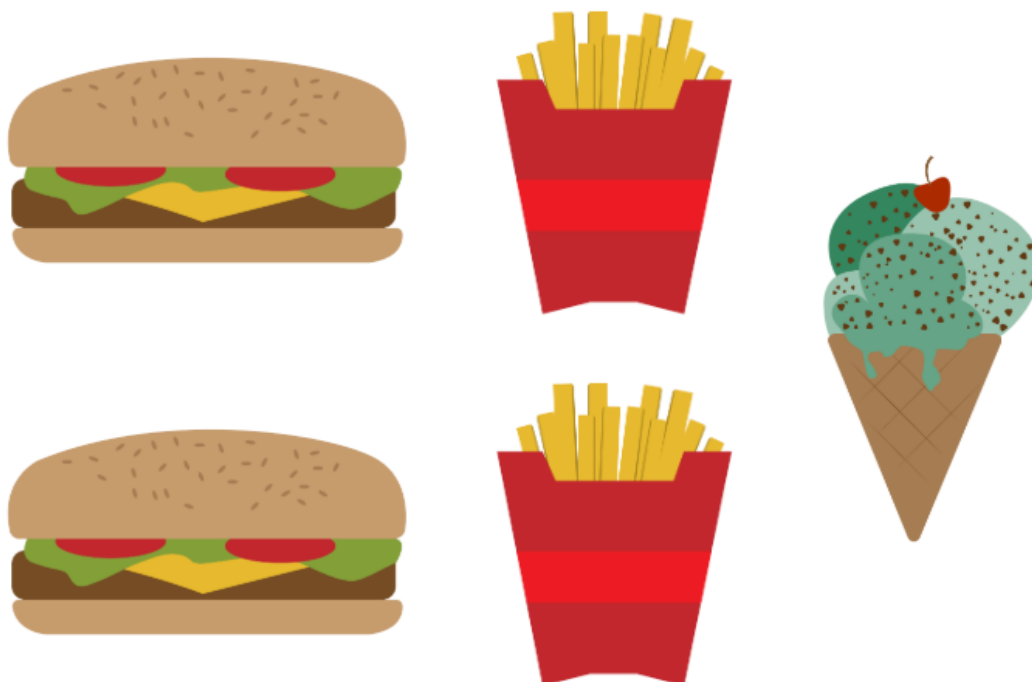
The example has a scenario and a picture. Please have the students use the Create a Combo Meal handout to display their scenario and picture for the Gallery Walk.

Example Student Response: Combo Meal Equation And Scenario

Students may come up with an equation like *4(5w+2f+3d+1s)*, for a scenario with four orders of five wings, two fries, three dipping sauces, and one salad.

Evaluate

Move to **slide 11**. Before the activity, pick up students' Create a Combo Meal handouts and display them around the room. Pass out the attached **Combo Meal Gallery Walk Journal** handout to each student and introduce the [Gallery Walk](#) strategy. Invite students to walk around the room and try to fill their Gallery Walk Journals by solving combo meal equations created by other students. Students should do so by drawing the combo meal, creating an expression based on the picture, and then simplifying the expression. The first line in the Gallery Walk Journal provides students an example based on the Create a Combo Meal Example from above.

Resources

- K20 Center. (n.d.). Elbow Partners. Strategies. https://learn.k20center.ou.edu/strategy/ccc07ea2d6099763c2dbc9d05b00c4b4
- K20 Center. (n.d.). Gallery Walk. Strategies. https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f505a54d