

Sharing Is Caring

Distributive Property

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Grade Level	8th Grade	**Time Frame**	2 class periods
Subject	Mathematics	**Duration**	75–85 minutes
Course	Pre-Algebra		

Essential Question

Why is it helpful to represent the same mathematical expression in multiple ways?

Summary

In this lesson, students will relate the distributive property to ordering a combo meal at a fast-food restaurant. Then they will apply this property to simplify algebraic expressions and explain their steps.

Snapshot

Engage

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

Explore

Students explore the different ways to algebraically represent their combo meal before they see that they created a real-world distributive property scenario.

Explain

Students formalize their understanding of using the distributive property and simplifying algebraic expressions.

Extend

Students simplify algebraic expressions and explain each step, identifying properties.

Evaluate

Students demonstrate their understanding by simplifying a given algebraic expression.

Standards

ACT College and Career Readiness Standards - Mathematics (6-12)

A303: Combine like terms (e.g., 2x + 5x)

Oklahoma Academic Standards Mathematics (8th Grade)

PA.A.3.2: Justify steps in generating equivalent expressions by combining like terms and using order of operations (to include grouping symbols). Identify the properties used, including the properties of operations (associative, commutative, and distributive).

Attachments

- Combo Meals—Sharing Is Caring - Spanish.docx
- Combo Meals—Sharing Is Caring - Spanish.pdf
- Combo Meals—Sharing Is Caring.docx
- Combo Meals—Sharing Is Caring.pdf
- Dinner Plates—Sharing Is Caring - Spanish.docx
- Dinner Plates—Sharing Is Caring - Spanish.pdf
- Dinner Plates—Sharing Is Caring.docx
- Dinner Plates—Sharing Is Caring.pdf
- Exit Ticket—Sharing Is Caring - Spanish.docx
- Exit Ticket—Sharing Is Caring - Spanish.pdf
- Exit Ticket—Sharing Is Caring.docx
- Exit Ticket—Sharing Is Caring.pdf
- Keep It Simple—Sharing Is Caring - Spanish.docx
- Keep It Simple—Sharing Is Caring - Spanish.pdf
- Keep It Simple—Sharing Is Caring.docx
- Keep It Simple—Sharing Is Caring.pdf
- Lesson Slides—Sharing Is Caring .pptx

Materials

- Lesson Slides (attached)
- Dinner Plates handout (attached; one per student; printed front only)
- Combo Meals handout (attached; one per student; printed front only)
- Keep It Simple handout (attached; one per student; printed front only)
- Exit Ticket handout (attached; one half page per student; printed front only)
- Copy paper (one blank page per student)
- Pencils
- Paper

10 minutes

Engage

Use the attached **Lesson Slides** to guide the lesson. Begin by introducing the title on **slide 2**. Review the essential question and lesson objectives on **slides 3-4**, then move to **slide 5** 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. Your friends are running late, so you decide to make their plates for them.

Give each student a copy of the attached **Dinner Plates** handout. Give students enough time to draw their explanations about how to fill everyone's plate equally. Then, move to **slide 6** and introduce the Elbow Partners strategy. 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?*

Teacher's Note: Guiding the Activity

Students should mention that the fairest way to fill each plate is to serve the same amount of food for each person. 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 term inside the parentheses of an expression.

20 minutes

Explore

Show **slide 7** and give each student a blank piece of copy paper. Ask the students the following question: *When you order fast food, is it cheaper to buy items separately or together in a combo meal?*

Move to **slide 8** and direct students to use their blank paper to create a name for their fast-food restaurant, create their own combo meal, and select variables for each item in their combo meal. Use the image on the slide to help students understand how to organize their blank paper. Give students 3-5 minutes to complete this task.

Teacher's Note: Guiding the Activity

Use this time to share with students what letters are good choices for variables, and which one might avoid. For example, O is often mistaken for zero; *l* can be mistaken for one; S can look like a five; etc.

Display **slide 9** and preview the activity with the class. Explain that students are to leave their paper on their desk and "visit" two other fast-food restaurants.

Give each student a copy of the attached **Combo Meals** handout and introduce the Gallery Walk strategy. Then transition through **slides 10-11** and model the activity. Slide 10 shows an example of what their no-longer-blank page should look like. And slide 11 shows how to represent their peer's work on their handout. Point out to students that they do not need to spend time re-drawing the food at the restaurants they visit like the handout shows for the given example. They are to use variables to represent the items in the combo meal.

Display **slide 12** while students complete the activity. Give students approximately 15 minutes to visit two restaurants and complete their handout.

15 minutes

Explain

After students complete the activity, show **slide 13** and ask students which property they used in the first row of each order on their Combo Meal handout. Help students understand why that was the *distributive property*. Let students know that they are going to practice identifying properties as they simplify algebraic expressions today. As needed, use this slide to remind students what an *algebraic expression* is (and how it differs from an equation).

Move to **slide 14**. Ask the class to walk you through the process of applying the distributive property, step-by-step. Consider writing the steps that 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 15**. Challenge students with the expression on this slide. Again, ask the class to walk you through the process of simplifying the given expression: $4(x + 5) - 2(x - 6)$. This time, ask students to justify each step, identifying the property used, when applicable. Use their answers to check their understanding of the concept before moving forward. Clarify any misunderstandings.

Sample Student Response:

$4(x + 5) - 2(x - 6)$ Given

$4x + 20 - 2x + 12$ Distributive Property

$4x + (-2x) + 20 + 12$ Commutative Property

$2x + 32$ Combining Like Terms

Optional: Adding Additional Problems

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

25 minutes

Extend

Teacher's Note: Activity Preparation

During this phase of the lesson, students are using a random-number generator to create their own practice problems. You will be modeling how to use this technology, so take time before this phase to become familiar with the CPM Probability Generators tech tool.

Students will navigate to bit.ly/3RandomNumbers, which is currently set up to randomly generate three integers from –10 to 10. If students need to adjust the interval of integers or the quantity of numbers generated, have them right-click on a number to adjust the settings.

If you would prefer a non-digital version of this activity, consider using polyhedral dice such as six-, eight-, ten-, twelve-, and/or twenty-sided dice.

Have students find a partner or assign partners. Show **slide 16** and give each student a copy of the attached **Keep It Simple** handout. Tell the class that they are going to work through the first problem together.

Navigate to bit.ly/3RandomNumbers to model how to use the random number generator. After generating three integers, direct students to record them in the blank rectangles for the first problem of their handout. Model this using the slide.

Display **slide 17** and tell students that right now, they are all Student #1. Direct students to use the random number generator to create their three expressions and simplify them. Remind them to show all steps of their work as they complete the first column. Give the students 10 minutes to create and simplify their expressions.

Show **slide 18** and ask students to trade papers with their partner. Tell students that they are all now Student #2. Direct students to check their partner's work and come to an agreement about the correct answers. Tell students to complete the second column by justifying each step of Student #1's work by identifying the property used. Give students 10-15 minutes to complete this portion of the activity.

5 minutes

Evaluate

Use the Exit Ticket strategy to individually assess what students have learned from the lesson. Display **slide 19** and give each student a copy of the attached **Exit Ticket** handout. Alternatively, have students write their answer on an index card, sticky note, piece of paper, etc.

Use student responses to determine whether they need additional practice with applying properties to simplify algebraic expressions or are ready for the next topic.

Resources

- K20 Center. (n.d.). Bell ringers and exit tickets. Strategies. https://learn.k20center.ou.edu/strategy/125
- K20 Center. (n.d.). CPM probability generators. Tech Tools. https://learn.k20center.ou.edu/tech-tool/2317
- K20 Center. (n.d.). Elbow partners. Strategies. https://learn.k20center.ou.edu/strategy/116
- K20 Center. (n.d.). Gallery walk / carousel. Strategies. https://learn.k20center.ou.edu/strategy/118