
Multiplication and Order of Operations

In this lesson, students will learn three rules for multiplication and will practice creating equations that prove those rules. This lesson also introduces students to note taking in math.

Goal

Students will identify and apply the properties of operations.

Common Core State Standard

CCSS.3.OA.B.5 Apply properties of operations (commutative property of multiplication, associative property of multiplication, distributive property) as strategies to multiply and divide.

Objectives

Students will identify and define the properties of operations.

Students will apply the properties of operations to equations.

Materials

- Prepare triangles cut out of construction paper with sets of numbers that students can use to create multiplication problems (i.e. 5, 2, 10 or 3, 6, 18). Write the numbers on the points of each triangle. You can laminate these triangles for students to use in future centers or activities.

Introduction: Math Language (5 minutes)

Write the following terms on the board: factor, product, sum, order, difference. Tell students to write their own definitions for each of the terms and create a picture that shows what each word means in math. If students are struggling to identify these terms or, if this is new learning for them, provide the definitions, and have students create the visual after you've defined each word.

Word	Math definition
Factor	A number that you use to multiply
Product	The answer of a multiplication problem (2 factors multiplied together)
Sum	The answer to an addition problem
Order	Put in sequence (i. e. 1, 2, 3)
Difference	The answer to a subtraction problem

Math Rules Mini-Lesson (10 minutes)

Explain to students that mathematicians have rules for how numbers work. Math rules are things that are always true in math. Ask students to think about some rules that we already have for how numbers work. Record these rules on an anchor chart for students to refer to throughout the year. Some number rule examples: numbers always show amounts, addition increases the amount, subtraction decreases the amount, and fractions are equal

parts of a whole.

Now, explain to students that they are going to learn three new rules. Have students create a grid on a paper to record their notes, or recreate the grid for students to record their notes in.

Rule	What it means	Example	In My Own Words
Commutative Property of Multiplication	The order of the numbers doesn't change the product (answer)	$4 \times 5 = 5 \times 4$	
Associative Property of Multiplication	How factors (numbers) are grouped doesn't matter in multiplication	$(2 \times 7) \times 3 = 2 \times (3 \times 7)$	
Distributive Property	Multiplying the sum or difference of a number is the same as multiplying the sum or difference by the number and adding (or subtracting) the product.	$3(5 + 2) = (3 \times 5) + (3 \times 2)$ $3(5 - 2) = (3 \times 5) - (3 \times 2)$	

Prove the Rule (15 minutes)

Pass out papers cut into triangles with numbers written on each point. Model how to use the three numbers to prove each of the three properties. For example: with a triangle with numbers 3, 4, and 2 on the points, you can create:

- Commutative Property: $3 \times 2 = 2 \times 3$
- Associative Property: $(3 \times 2) \times 4 = 3 \times (2 \times 4)$
- Distributive Property: $3 \times (2 + 4) = (3 \times 2) + (3 \times 4)$

Have students work independently or in pairs. They should work through as many triangles as possible in the time allotted. One way to differentiate this activity and provide additional choice and challenge for students is to color code the triangles with numbers that are more challenging or less challenging on triangles of different colors (green triangles could have easier numbers to work with while red triangles had more challenging numbers, for example).

Reverse It (15 minutes)

This time, tell students that you are going to give them a number and ask them to create equations that could get them to that number. For example, if you give students the number 24, they could create the equations: 3×8 , 8×3 , $(2 \times 4) \times 3$, or $(4 \times 2) + (3 \times 1)$. Have students create equations for as many numbers as possible.

Math Talk (5 minutes)

As you conclude, ask students to reflect and share:

What did you learn about numbers during this lesson?

How will you use these properties during the year?

How can you help yourself remember these rules for numbers?

Extension Activity

Give students number cards and cards with math symbols on them (parentheses, x , $+$, etc). Have students stand in front of the room and rearrange themselves to show equations that represent each rule.

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