## Property Posters

## Summary

This activity is going to focus on helping students remember the commutative, associative, distributive, and identity properties of addition and multiplication by having the students create posters that they will hang around the school or classroom.

## Group Size

Small Groups

## Materials

Invitation to Learn
Examples of different types of posters (movie, educational, motivational, sport, or quick reference)
Math journals
Instructional Procedures

## Poster Paper

Crayons
Math Journals

## Background for Teachers

The most important background information for this activity is that teachers need to be familiar with the commutative and associative properties of addition and multiplication. They also need to be familiar with the zero and identity properties of multiplication and know how to teach these properties to their students.
The associative property is the rule that refers to grouping. For addition, the rule is "a+(b+c)=(a+ b) +c ". In numbers, this means $2+(3+4)=(2+3)+4$. For multiplication, the rule is " $a(b c)=(a b) c$ "; in numbers, this means $2(3 \times 4)=(2 \times 3) 4$.
The commutative property is the one that refers to moving numbers around. For addition, the rule is " $a+b=b+a$ "; in numbers, this means $2+3=3+2$. For multiplication, the rule is "ab=ba"; in numbers, this means $2 \times 3=3 \times 2$.
The identity property teaches us that any number multiplied by 1 will always equal that same number. Finally, the zero property of multiplication teaches us that any number multiplied by 0 will always equal 0 .

## Intended Learning Outcomes

2. Become effective problem solvers by selecting appropriate methods, employing a variety of strategies, and exploring alternative approaches to solve problems.
3. Communicate mathematical ideas and arguments coherently to peers, teachers, and others using the precise language and notations of mathematics.

## Instructional Procedures

## Invitation to Learn

The purpose of this invitation to learn is to help students understand that posters are used for a variety of reasons, many of which focus on advertising, communication, and information. Before beginning this activity, place a variety of posters around the room. Most classrooms already have posters hanging in them but for this activity try and hang some new or different posters that are new to the students.

Begin by saying, "As you may have noticed, I have hung some different posters around the room. I want you to take a few minutes, wander around the room, and look at the posters. As you wander, I want you think about the questions I am going to write on the board." Write the following questions on the board: Why do we have posters (what do posters do)? Are there different types of posters? Which ones do you like the best?
Then say, "The questions I want you to think about are: Why do we have posters (what do posters do)? Are there different types of posters? And which ones do you like the best? After you have wandered around the room, I want you to take a minute or two and write down your thoughts in your math journals." Give the students two or three minutes to look at the posters before sending them back to their desks to write in their journals.
After the students have written in their math journals, start with question one and say, "Let's talk about why we have posters. Does anyone have any ideas about why we have posters?" Let the students share their ideas. Help them come to the understanding that posters are used to advertise things, communicate ideas, entertain, and share information.
Then ask, "How many of you think that there are different types of posters? Do we have different types of posters in our classroom?" Call on different students to point at different posters throughout the room. As you point them out, compare different posters, finding similarities and differences. End this invitation to learn by discussing the third question. Say, "So, which posters did you like the best?" As you call on students to share, follow up this question with the famous "Why?" It is important that students explain why they like the posters. This will help them as they design their own posters in the next activity.
Instructional Procedures
This activity is going to focus on helping students remember the commutative, associative, distributive, and identity properties of addition and multiplication by having the students create posters that they will hang around the school or classroom. However, this activity is not going to focus on teaching the properties. If the students haven't written these properties down in their math journals yet, have them write them down as you review.

Begin this activity by dividing your class into groups of 4-6 students. Start by saying, "Today we are going to be reviewing the properties of addition and multiplication. When we are done, we are going to make posters that we can place around the room or school to help us remember them."
Go to the board and write Properties of Addition and Multiplication. Say, "There are four properties that we are going to include on our posters. I am going to model and review the properties first, and then you will get into your groups and design a poster that demonstrates each property."
Next say, "We are going to start with the commutative property. The Commutative property teaches us that when we add or multiply two numbers, we can add or multiply them in any order."
Write $2+4$ and $2 \times 4$ on the board. Start with $2+4$ and say, "Let's look at $2+4$. When we add 2 and 4 together, what do we get? 6." Now ask, "What happens when I switch the 4 and 2 and write $4+2$ ? What answer do we get? Do we get the same answer? Yes, we do. Now I want you to take a few seconds in your group and discuss why we get the same answer. Get ready to share your answers." Give the students some time to discuss. Have them share their answers when they are done. As the students share their answers, emphasize the fact that it doesn't matter what order you add because you will get the same answer.
Repeat this same process using $2 \times 4$ to review for multiplication.
Then say, "The next property we are going to review is the associative property. The associative property is similar to the commutative property except it uses three or more numbers." Write $2+$ $4+3$ and $2 \times 4 \times 3$ on the board and then say, "Let's start with $2+4+3$. We can use
parentheses to help us add when we have more numbers." Place parentheses around the $2+4$ so that it looks like $(2+4)+3$. Most problems already have the parentheses around them when they have three or more numbers but it is important to help students understand that they can use parentheses to help them out.
Say, "Remember, when using order of operations we always do what is in parentheses first. What two numbers are in the parentheses? $2+4$. Let's add those together. What do we get? 6. Good." Write the 6 below $(2+4)$. Then say, "Now that we have added 2 and 4 , we need to add 3 to our answer. Let's add $6+3$. What do we get? 9."
Now say, "Let's try this problem again, but this time we'll move the parentheses and place them around the 4 and 3." Place parentheses around the $4+3$ so that the problem now looks like $2+$ $(4+3)$. Ask the class, "What's the rule about parentheses? Good, we need to do the problem in the parentheses first. Let's add $4+3$. What answer do we get? 7." Write the 7 below the $(4+3)$. Now ask the class, "What do we do now?" Wait for the appropriate answer and then say, "That's right, we need to add $2+7$. What do we get? 9. Did we get the same answer? We did, didn't we? Just like the Commutative property, the Associative property teaches us that it doesn't matter the order in which we add three or more numbers because we will get the same answer."
Repeat this same exercise with $2 \times 4 \times 3$ to review the associative property for multiplication.
Next say, "Now that we have discussed the associative and commutative properties, we have
two more properties that we need to talk about. These are the Identity and Zero properties of multiplication." Write $6 \times 1=$ ? on the board and ask, "What do we get when we multiply $6 \times 1$ ?"
Wait for the students to answer. Do this a few more times with different numbers multiplied by

1. When you have done this, ask the class, "What do you notice about these problems?" Lead the discussion towards the fact that any number multiplied by 1 will equal that same number. End by saying, "This is what the Identity property teaches us. Any number multiplied by 1 equals that same number."
"Let's finish our review by talking about the Zero property of multiplication." Write $6 \times 0=$ ? on the board and then ask, "Does anyone know what happens when we multiply 6 by 0 ? What answer do we get? Zero, that's right. What would happen if I multiplied 1,000 by 0? What answer would we get? Zero again. What about 1,000,000 x 0 ? Do we get zero again? We do. This is what the Zero property of multiplication teaches us. Any number multiplied by zero, no matter how big or small, will always equal zero."
Now say, "Now that we have reviewed the properties of addition and multiplication, I am going to pass out a piece of poster board and markers (crayons or colored pencils) to each group. On your poster, you are going to define and give examples of each property. You can decorate the poster however you like, but make sure that it is your best penmanship and artwork. You can also use your math books and math journals to help you define the properties. If you are not sure about the wording of your definition, raise your hand for clarification."
Pass out the poster paper, and markers (crayons or colored pencils), and allow the students to work on their posters. As students work, it is important that the teacher monitors the definitions that the students are writing.
When students are finished with their posters, allow them to present the posters to the class and then let them decide where they would like to hang them.

## Extensions

Curriculum Extensions/Adaptations/ Integration
Advanced learners may study the history of posters and then write a paper explaining what they found.
Learners with special needs may work cooperatively with regular education students.
Instead of creating posters, students may develop an alternative media source (TV commercials,
postcards, radio ads) that explain the properties.
The associative, commutative, identity, and zero properties can be used as spelling words. Family Connections

Students may create their own posters for their rooms or homes.
Students may create a "family" poster to share with the class.

## Assessment Plan

Use the student posters to assess student understanding of addition and multiplication properties. Students may develop their own property problems.
Students can conduct a survey of other classes to see if the posters helped them remember the properties.

Bibliography

## Research Basis

Millis, B.J. (2002). Enhancing learning-and more! through cooperative learning. Idea Paper \# 38. The Idea Center, 211 South Seth Child Road Manhattan.
In this article, Millis explains the power and effectiveness of cooperative learning. Not only is cooperative learning an effective teaching strategy, it "promotes a shared sense of community" in the classroom because "learning, like living, is inherently social." As students learn to work together through cooperative learning, they develop trust with each other and are given an opportunity to develop self-efficacy. As teachers come to understand how to implement cooperative learning, "student learning can be deepened, students will enjoy attending classes, and they will come to respect and value the contributions of their fellow classmates."
Willis, J. (2007). Cooperative learning is a brain turn-on. Middle School Journal. March pgs. 4-13. Judy Willis states in her article that research has shown that "in math collaboration, students learn to test one another's conjectures and identify valid or invalid solutions." This happens because cooperative learning provides students with the most opportunities to ask questions, express ideas and opinions, and come to conclusions that they might not otherwise have through whole group instruction. Teachers can increase student understanding and involvement by increasing the amount of cooperative learning in their classrooms.

## Authors

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