Party of Properties

Commutative, Associative and Distributive Properties

Grade Level	6th – 8th Grade
Subject	Mathematics
Course	Middle School Mathematics

Essential Question

How do the commutative, associative, and distributive properties in math help us solve problems more easily?

Summary

This lesson gives students a real-world view on how an event coordinator uses commutative, associative, and distributive properties in their job. By the end of the lesson, students will be able to simplify expressions using these properties and apply that knowledge to real-world scenarios.

Snapshot

Engage Students will read statements about the order of operations and determine if they are always, sometimes, or never true.

Explore Students will investigate the order of operations with a partner.

Explain Students will examine the rules of commutative, associative, and distributive properties to solidify their understanding.

Extend Students will watch an ICAP video about using commutative, associative, and distributive properties as an event coordinator, then respond by analyzing a real-life scenario and creating an expression to solve their problem.

Evaluate Students will participate in Blooket activity to assess their learning.

Standards

Oklahoma Academic Standards Mathematics (6th Grade)

6.A.2.1: Generate equivalent expressions and evaluate expressions involving positive rational numbers by applying the commutative, associative, and distributive properties and order of operations to model and solve mathematical problems.

Oklahoma Academic Standards Mathematics (6th Grade)

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

Oklahoma Academic Standards Mathematics (6th 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

- Guided Notes handout - Teacher's Guide-Party of Properties.docx
- Guided Notes handout-Party of Properties.docx
- Lesson Slides-Party of Properties.pptx
- Operation Testing handout-Party of Properties.docx
- Party of Properties CSV Document.csv
- Planning Scenarios handout-Party of Properties.docx
- Planning Scenarios-Teacher's Guide-Party of Properties.docx

Materials

- Lesson Slides (attached)
- Dice (one per student)
- Operation Testing handout (attached; one per student)
- Guided Notes handout (attached; one per student)
- Guided Notes-Teacher’s Guide (attached)
- Blank paper (one per student)
- Planning Scenarios handout (attached; one per group)
- Planning Scenarios- Teacher’s Guide (attached)
- Party of Properties CSV document (attached)
- Pen/Pencil
- Internet capable device

Engage

Use the attached **Lesson Slides** to guide the lesson. Begin by introducing the title on **slide 2.** Review the Essential Question on **slide 3**, and the Lesson Objective on **slide 4.** Move to **slide 5** and direct students to use the instructional strategy Always, Sometimes, or Never True to respond to the prompts on the following slides. Ask students to respond to each prompt by deciding if it is always true, sometimes true, or never true. Show **slides 6-11** to display each of the prompts. Allow students time to reach their decision to each prompt, then ask students to share their responses with the class.

While students discuss **slides 6-11**, do not correct or redirect students. They will take time to test each of these statements during the Explore portion and revisit the strategy after the next activity.

Teacher's Note

Optional Movement Activity:

If you would like to incorporate movement in this activity, designate a different corner of the room for " always true", "sometimes true", and "never true." Display the first prompt and instruct students to move to the corner of the room where the statement they agree with is. Repeat this process for each prompt.

20 minutes

Explore

Instruct students to form partner groups . Distribute the **Operation Testing** handout (attached) and one die. Display **slide 12.** For the front side (Side A) of the handout, instruct students to roll the die once for each blank on the first expression (twice total) and then show the solution below it. To the right side of the arrow, have students reverse the order of the rolled numbers to see if the solution remains the same with reversed numbers in the expression. If the answers are the equivalent, have students check the box next to the expressions.

Example:

$$\underline{5} + \underline{2} \rightarrow \underline{2} + \underline{5}$$

As students begin to finish Side A of the handout, display **slide 13** to show the instructions for Side B**.** Instruct students to roll the die once for each blank in the expression (three times total) and then show the solution below it. To the right side of the arrow, have students re-record each number in the first three blanks and find the new solution. If the answers are the equivalent, have students check the box next to the expressions.

Example:

$$\underline{5} + (\underline{2} + \underline{3}) \rightarrow (\underline{5} + \underline{2}) + \underline{3}$$

Allow students 10-15 minutes to complete the handout.

After students finish the Operation Testing handout, revisit the Always, Sometimes, Never True statements on **slides 14-20**. Have students use the operations they tested to discuss each prompt.

20 minutes

Explain

Teacher's Note

Use the **Guided Notes-Teacher's Guide** to help facilitate this part of the lesson. If you have an interactive whiteboard or similar technology in your classroom, unhide slides 23, 26, and 29 to be able to write directly on the slide to facilitate the guided notes. Otherwise, print a blank copy of the guided notes handout and utilize a document camera or similar technology to fill out the guided notes with the class.

If your students need additional scaffolding in regards to the vocabulary:

- Relate the word "commutative" to a "commute" for a job. You are still the same person, but you have moved locations.
- Relate the word "associative" to friends. You might hear about someone associating with another person, but that doesn't mean that is their only friend.
- Relate the word "distributive" to delivery. A delivery driver will visit each house or location.

Display **slide 21** and distribute **Guided Notes** handout (attached).

Direct students to fill in each section of the handout as you discuss it.

Display **slide 22.** Using Side A of the Operation Testing handout as a guide, have students determine which operations remained equivalent regardless of the order of the numbers. Direct your students' attention back to their Guided Notes handout. Ask students to reflect on Side A of the Operation Testing handout and discuss what they think the rule for the associative property might be. When the students are done discussing, complete the rest of the commutative property section of the notes with your students taking time to clear up any misconceptions and answer questions as they work.

On **slide 24**, discuss with students what they would do first to simplify the expression on the screen. As students share their first step, prompt them to share why that is what they would do first. Transition to **slide 25** and repeat the discussion. Direct your students' attention back to their Guided Notes handout. Ask students to reflect on the last two slides and discuss what they think the rule for the associative property might be. When the students are done discussing, complete the rest of the associative property section of the notes taking time to clear up any misconceptions and answer questions as they work.

On **slide 27**, discuss with students what they would do to simplify the expression on the screen. After students finish discussing, transition to **slide 28**. Have the students identify what is different in this expression versus the previous expression. Then, ask them to try to simplify. If students seem stuck, transition back to the previous slide to see if they could simplify that expression differently. Direct your students' attention back to their Guided Notes handout. Ask students to reflect on the last two slides and discuss what they think the rule for the distributive property might be. When the students are done discussing, complete the rest of the distributive property section of the notes with your students, taking time to clear up any misconceptions and answer questions as they work.

Extend

Ask students to take out a blank piece of paper. Display **slide 30.** Introduce the instructional strategy First Word, Last Word. Using their blank sheet of paper, ask students to write down one word they think of in relation to the occupation: "event coordinator". Allow students a few minutes to write down their word. Move to **slide 31** and play the ICAP video on the slide: "K20 ICAP - Event Coordinator - Party of Properties".

Embedded video

https://youtube.com/watch?v=3glZJ-Jlm9U

Once the video has ended, display **slide 32** and direct students to revisit the instructional strategy First Word, Last Word to write a new word they associate with the occupation: "event coordinator". Ask students to share their words with a partner or with the class.

Group students in pairs or groups of three or four. Distribute the **Planning Scenario** handout(attached). Transition to **slide 33**. Direct students to review their event scenario. As they review, direct students to identify important information that will help them determine what the needed outcome of the scenario is. Remind them to use their Operation Testing handout and Guided Notes handout for reference. Have students create the expression that represents the scenario and determine which property best fits their expression. After all groups have completed their handout, ask for groups to share their results with the class. Use the **Planning Scenarios-Teacher's Guide** (attached) to help assess students' answers.

Teacher's Note

Optional second extend:

If you would like to utilize your district provided curriculum and have students complete one of those practices, do so here.

10 minutes

Evaluate

Teacher's Note

Preparation Note:

It is recommended that you set up your Blooket account prior to beginning this lesson.

Here are the steps to create this activity:

1. Download the **Party of Properties CSV** and save to your device. Make sure it downloads as a CSV document.
2. Go to Blooket.com and click "sign up" or "log in".
3. Click "Create" located in the upper left corner of the screen.
4. Create a title, add a description, and select a cover image for your Blooket activity.
5. Under "Creation Method", select "CSV Import".
6. Click "Create" to import your CSV file.
7. On the pop up that appears, click "Upload CSV" and select your **Party of Properties CSV document** from the options.
8. Once the CSV has been imported, click "Save Set" on the left side of the screen.
9. You may now "assign" or "host" your Blooket by choosing the game you'd like to use.

Here are the steps to host the activity:

1. Go to Blooket.com and log in.
2. Select the set you would like to use by clicking "Host".
3. Select the "Live Game Mode" you want to use by clicking on it.
4. Click "Host" on the right side of the screen.
5. Select the settings that best fit your class's needs then click "Host Now."

Copy the Game ID to **slide X** where it says, "insert Game ID here."

Display **slide 34**. Direct students to use their internet device to log into Blooket by navigating to play.blooket.com. Provide them with the game ID to join. Direct students to complete the Blooket activity.

When students have completed the Blooket activity, move to **slide 35**. Direct students to take out pencil and simplify the displayed expressions using what they have learned on the same paper they used for their First Word Last Word activity. Direct students to turn their paper in as their Exit Ticket before leaving.

Resources

- K20 Center. (n.d.). Always, sometimes, or never true. Strategies. https://learn.k20center.ou.edu/strategy/145
- K20 Center. (n.d.). Bell ringers and exit tickets. Strategies. https://learn.k20center.ou.edu/strategy/125
- K20 Center. (n.d.). Blooket. Tech tools. https://learn.k20center.ou.edu/tech-tool/2386
- K20 Center. (n.d.). First word/last word. Strategies. https://learn.k20center.ou.edu/strategy/148
- OpenAI. (2023). *ChatGPT* (Mar 14 version) [Large language model]. https://chat.openai.com/chat
- YouTube. (2024, March, 15). K20 ICAP - Event Coordinator - Party of Properties. YouTube. https://www.youtube.com/watch?v=3glZJ-Jlm9U