

LESSON 2

Objective

Evaluate numerical expressions with parentheses and brackets.

Common Core State Standards

- **5.OA.1** Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Operations and Algebraic Thinking

Using Parentheses and Brackets

In the previous lesson, students investigated the order of operations by working with relatively simple expressions. Some situations call for more extensive use of parentheses and other grouping symbols, such as brackets and braces. In this lesson, students evaluate expressions with these symbols.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Ask:** *Why do the models have different solutions?*
- **Ask:** *Why do we have to add the numbers inside the brackets, $4 + 6$, first? What is the next step? What is the final step?*
- Write $[4(3 + 6)] - 8$ on the board. Have students identify which part of the expression to evaluate first, second, and third.

Solve It

Reread the problem with students. Have students draw a picture of the tables and chairs as a solution to the problem. Have them explain to their partners how their pictures represent the expression.

More Ideas

For other ways to teach about using parentheses and brackets—

- Write $[3(7 - 5)] + 18$ and $[4(2 + 5)] - 18$ on the board. Have pairs predict which expression will be greater. Next, have each student use Color Tiles to model one of the expressions and explain their model to their partner. Then have them evaluate which expression is greater and compare their findings to their prediction.
- Write $35 - 4 \times 9 - 1 = 3$ on the board. Have students use Two-Color Counters to model the expression and write the expression with parentheses and brackets.

Formative Assessment

Have students try the following problem.

Simplify: $12 - [2(8 - 5)]$

- A. 1 B. 6 C. 18 D. 24

Try It!

20 minutes | Groups of 4

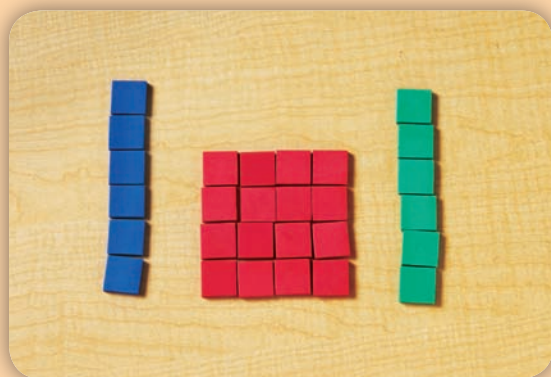
Here is a problem about using parentheses and brackets.

There are 4 tables in the library. Each table has 4 red chairs and 6 blue chairs. There are 6 extra chairs in the back of the room. How many chairs are in the library?

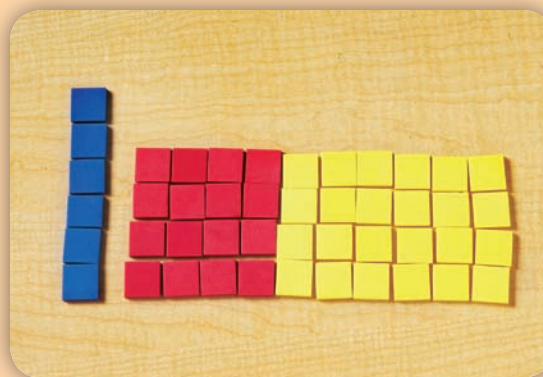
Introduce the problem. Then have students do the activity to solve the problem. Distribute Color Tiles, paper, and pencils to students.

Materials

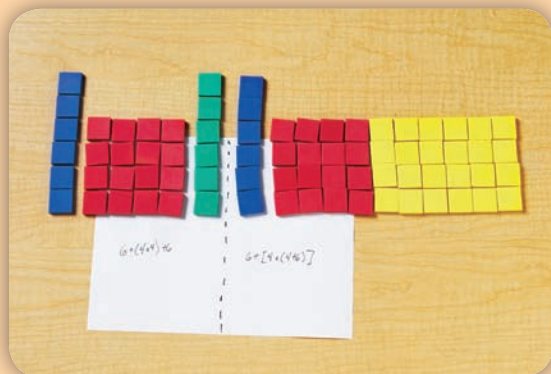
- Color Tiles (100 per group)
- paper
- pencils



1. Write $6 + [4 \times (4 + 6)]$ on the board. Have students start by laying down a column of 6 tiles. Next, have students add a 4-by-4 array. Then have them lay down another column of 6 tiles. **Ask:** How many tiles are shown in this model?



2. Have students lay down a column of 6 tiles. Next, have students show $4 + 6$ in a row using a different color of tile for each addend. Then have them build an array to show 4 times this quantity. **Ask:** How many tiles are shown in this model?



3. Say: You built two models. **Ask:** How are they different? Have students write expressions to represent the models. **Ask:** Which model correctly represents the problem scenario?

Look Out!

Students might have difficulty simplifying expressions in the proper order. Suggest they write the expression on a piece of paper and use highlighters to mark quantities in brackets one color and quantities in parentheses another color. Tell them to work from inside out.



Use Color Tiles to build the model. Evaluate the expression.

(Check students' work.)

1. $3 \times (5 + 4) = \underline{27}$



Using Color Tiles, model the expression. Sketch the model. Evaluate the expression.

2. $4 \times (6 + 3) = \underline{36}$

3. $3 \times [8 - (4 + 2)] = \underline{6}$

(Check students' models.)

Evaluate each expression.

4. $2 \times (9 + 1) = \underline{20}$

5. $8 \times (7 - 2) + 12 = \underline{52}$

6. $8 + (3 \times 4) = \underline{20}$

7. $3 \times [5 + (8 - 3)] = \underline{30}$

8. $5 \times [8 - (9 - 4)] = \underline{15}$

9. $4 + [12 - (4 + 2)] = \underline{10}$



Answer Key

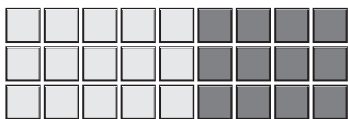
Challenge! Using one set of parentheses, make the expression $7 + 5 \times 3 + 8$ equal to 44.

Challenge: $(7 + 5) \times 3 + 8$

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Use Color Tiles to build the model. Evaluate the expression.

1. $3 \times (5 + 4) = \underline{\hspace{2cm}}$



Using Color Tiles, model the expression. Sketch the model. Evaluate the expression.

2. $4 \times (6 + 3) = \underline{\hspace{2cm}}$

3. $3 \times [8 - (4 + 2)] = \underline{\hspace{2cm}}$

Evaluate each expression.

4. $2 \times (9 + 1) = \underline{\hspace{2cm}}$

5. $8 \times (7 - 2) + 12 = \underline{\hspace{2cm}}$

6. $8 + (3 \times 4) = \underline{\hspace{2cm}}$

7. $3 \times [5 + (8 - 3)] = \underline{\hspace{2cm}}$

8. $5 \times [8 - (9 - 4)] = \underline{\hspace{2cm}}$

9. $4 + [12 - (4 + 2)] = \underline{\hspace{2cm}}$

Name _____

Challenge! Using one set of parentheses, make the expression $7 + 5 \times 3 + 8$ equal to 44.

[illegible]