

Lesson 13-2

Monday, April 13, 2020 10:57 AM

Name _____

Solve & Share Evaluate the expression $3 + (6 - 2) \times 4$.
Solve this problem using the order of operations.

$$3 + (6 - 2) \times 4$$
$$3 + \underline{4 \times 4}$$
$$3 + 16 = 19$$

Lesson 13-2
Evaluate Expressions

I can ...
evaluate expressions with parentheses, brackets, and braces.

Content Standard 5.OA.A.1
Mathematical Practices MP.1, MP.3, MP.6, MP.7

() - Parentheses
[] - Brackets
{ } - Braces

* Work from the inside out.

You can use **structure** to evaluate expressions with more than one term.
Show your work!

Look Back! **MP.3 Construct Arguments** Are parentheses needed in the expression $(8 \times 5) - 9 + 6$? Explain your answer.

No, multiplication is the step before adding or subtracting. Parentheses are NOT needed.

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What Order Should You Use When You Evaluate an Expression?

Jack evaluated $[(7 \times 2) - 3] + 8 \div 2 \times 3$.

To avoid getting more than one answer, he used the order of operations given at the right.



Parentheses, brackets, and braces are all used to group numbers in numerical expressions.

Order of Operations

- 1 Evaluate inside parentheses (), brackets [], and braces { }.
- 2 Multiply and divide from left to right.
- 3 Add and subtract from left to right.

Step 1

First, do the operations inside the parentheses.

$$[(7 \times 2) - 3] + 8 \div 2 \times 3$$

$$[14 - 3] + 8 \div 2 \times 3$$

Then, evaluate the terms inside the brackets.

$$[14 - 3] + 8 \div 2 \times 3$$

$$11 + 8 \div 2 \times 3$$

Step 2

Next, multiply and divide in order from left to right.

$$11 + 8 \div 2 \times 3$$

$$11 + 4 \times 3$$

$$11 + 12$$

Step 3

Finally, add and subtract in order from left to right.

$$11 + 12 = 23$$

So, the value of the expression is 23.

Convince Me! **MP.3 Construct Arguments** Would the value of $2 + [(15 - 3) - 6] \div 2$ change if the braces were removed? Explain.

$\{ 2 + [(15 - 3) - 6] \} \div 2$ $\{ 2 + [12 - 6] \} \div 2$ $\{ 2 + 6 \} \div 2$ $8 \div 2 = 4$	$2 + [(15 - 3) - 6] \div 2$ $2 + [12 - 6] \div 2$ $2 + 6 \div 2$ $2 + 3 = 5$
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★ Guided Practice

Do You Understand?

1. Explain the steps involved in evaluating the expression $[(4 + 2) - 1] \times 3$.
2. Would the value of $(12 - 4) \div 4 + 1$ change if the parentheses were removed? Explain.

Do You Know How?

In 3–6, use the order of operations to evaluate the expression.

3. $[7 \times (6 - 1)] + 100$
4. $17 + 4 \times 3$
5. $(8 + 1) + 9 \times 7$
6. $\{[(4 \times 3) \div 2] + 3\} \times 6$

★ Independent Practice

Leveled Practice In 7–21, use the order of operations to evaluate the expression.

Remember to evaluate inside parentheses, brackets, and braces first.



- | | | |
|--|--------------------------------|---|
| 7. $8 \times (3 + 4) \div 2$ | 8. $39 + 6 \div 2$ | 9. $24 \div [(3 + 1) \times 2]$ |
| $8 \times \underline{\quad} \div 2 = 28$ | $39 + \underline{\quad} = 42$ | $\underline{\quad} \div [\underline{\quad} \times \underline{\quad}] = 3$ |
| 10. $5 \div 5 + 4 \times 12$ | 11. $[6 - (3 \times 2)] + 4$ | 12. $(4 \times 8) \div 2 + 8$ |
| 13. $(18 + 7) \times (11 - 7)$ | 14. $2 + [4 + (5 \times 6)]$ | 15. $(9 + 11) \div (5 + 4 + 1)$ |
| 16. $90 - 5 \times 5 \times 2$ | 17. $120 - 40 \div 4 \times 6$ | 18. $22 + (96 - 40) \div 8$ |
| 19. $(7.7 + 0.3) \div 0.1 \times 4$ | 20. $32 \div (12 - 4) + 7$ | 21. $[8 \times [1 + (20 - 6)]] \div \frac{1}{2}$ |

*For another example, see Set A on page 767.

$$3. [7 \times (6 - 1)] + 100$$

$$[7 \times 5] + 100$$

$$35 + 100 = 135$$

$$5. (8 + 1) + 9 \times 7$$

$$9 + 9 \times 7$$

$$9 + 63 = 72$$

$$6. \{[(4 \times 3) \div 2] + 3\} \times 6$$

$$\{[12 \div 2] + 3\} \times 6$$

$$\{6 + 3\} \times 6$$

$$9 \times 6 = 54$$

Complete 19, 21, 23, 27

$$19. (7.7 + 0.3) \div 0.1 \times 4$$

$$8 \div 0.1 \times 4$$

$$80 \times 4 = 320$$

$$21. \{8 \times [1 + (20 - 6)]\} \div \frac{1}{2}$$

$$\{8 \times [1 + 14]\} \div \frac{1}{2}$$

$$\{8 \times 15\} \div \frac{1}{2}$$

$$120 \div \frac{1}{2}$$

$$120 \times \frac{2}{1} = \frac{240}{1} = 240$$

$$0.1 \overline{) 800} \\ \underline{800} \\ 0$$

★ Math Practices and Problem Solving

22. Dan and his 4 friends want to share the cost of a meal equally. They order 2 large pizzas and 5 small drinks. If they leave a tip of \$6.30, how much does each person pay?

Menu	
Small pizza	\$8.00
Large pizza	\$12.00
Small drink	\$1.50
Large drink	\$2.25

23. **Higher Order Thinking** Use the operation signs $+$, $-$, \times , and \div once each in the expression below to make the number sentence true.
 $6 \square (3 \square 1) \square 5 \square 1 = 17$
24. **MP.6 Be Precise** Carlotta needs $12\frac{1}{2}$ yards of ribbon for a project. She has $5\frac{1}{4}$ yards of ribbon on one spool and $2\frac{1}{2}$ yards on another spool. How much more ribbon does she need?
25. Theresa bought three containers of tennis balls at \$2.98 each. She had a coupon for \$1 off. Her mom paid for half of the remaining cost. How much did Theresa pay? Evaluate the expression $[(3 \times 2.98) - 1] \div 2$.
26. **Math and Science** Giraffes are *herbivores*, or plant eaters. A giraffe can eat up to 75 pounds of leaves each day. Write and evaluate an expression to find how many pounds of leaves 5 giraffes can eat in a week.



Evaluate the expression in the parentheses first. Then subtract inside the brackets.

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27. Using the order of operations, which operation should you perform last to evaluate this expression?
 $(1 \times 2) + (5 \div 3) + (6 - 5) - 100 + 6$
28. Draw lines to match each expression to its value.
 $29 - (5 - 3)$ 4

$$23. 6 \times (3 - 1) + 5 \div 1 = 17$$

$$6 \times 2 + 5 \div 1$$

$$12 + 5 \div 1$$

$$12 + 5 = 17$$

27. Using the order of operations, which operation should you perform last to evaluate this expression?

$$(1 \times 2.5) + (52 \div 13) + (6.7 - 5) - (98 + 8)$$

- A Addition
- B Subtraction
- C Multiplication
- D Division

28. Draw lines to match each expression to its value.

$$29 - (5 - 3)$$

4

$$25 - 5 \div 5$$

21

$$(2 \times 6) - (2 \times 4)$$

24

$$[5 \times (6 - 2)] + 1$$

27