

Learning Objective: Students will be able to use the order of operations to evaluate a numerical expression.

Warm Up

$$6 \overline{)2466}$$

$$3 \overline{)696}$$

$$9 \overline{)3240}$$

$$1 \overline{)204}$$

$$2 \overline{)1488}$$

$$5 \overline{)4425}$$

$$9 \overline{)6597}$$

$$8 \overline{)6376}$$

$$6 \overline{)5238}$$

$$3 \overline{)438}$$

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Warm Up Answers

$$\begin{array}{r} 411 \\ 6 \overline{)2466} \end{array}$$

$$\begin{array}{r} 232 \\ 3 \overline{)696} \end{array}$$

$$\begin{array}{r} 360 \\ 9 \overline{)3240} \end{array}$$

$$\begin{array}{r} 204 \\ 1 \overline{)204} \end{array}$$

$$\begin{array}{r} 744 \\ 2 \overline{)1488} \end{array}$$

$$\begin{array}{r} 885 \\ 5 \overline{)4425} \end{array}$$

$$\begin{array}{r} 733 \\ 9 \overline{)6597} \end{array}$$

$$\begin{array}{r} 797 \\ 8 \overline{)6376} \end{array}$$

$$\begin{array}{r} 873 \\ 6 \overline{)5238} \end{array}$$

$$\begin{array}{r} 146 \\ 3 \overline{)438} \end{array}$$

Lesson 1.3

September 12, 13, & 14, 2016

Essential Question What is the effect of inserting parentheses into a numerical expression?

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Self-Evaluation Scale

Score	Description
4	I can teach other students how to use the order of operations to evaluate a numerical expression.
3	I can use the order of operations to evaluate a numerical expression.
2	I recognize, but still need help to use the order of operations to evaluate a numerical expression.
1	I do not know how to use the order of operations to evaluate a numerical expression.

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Activity 1 & 2

With a partner, work on Activity 1 & 2
on pages 11 & 12 of your Big Ideas
Record and Practice Journal.

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1 ACTIVITY: Comparing Different Orders

Work with a partner. Find the value of the expression by using different orders of operations. Are your answers the same? (Circle *yes* or *no*.)

a. Add, then multiply. Multiply, then add. Same?
 $3 + 4 \times 2 = \underline{\hspace{2cm}}$ $3 + 4 \times 2 = \underline{\hspace{2cm}}$ Yes No

b. Add, then subtract. Subtract, then add. Same?
 $5 + 3 - 1 = \underline{\hspace{2cm}}$ $5 + 3 - 1 = \underline{\hspace{2cm}}$ Yes No

c. Divide, then multiply. Multiply, then divide. Same?
 $12 \div 3 \cdot 2 = \underline{\hspace{2cm}}$ $12 \div 3 \cdot 2 = \underline{\hspace{2cm}}$ Yes No

d. Divide, then add. Add, then divide. Same?
 $16 \div 4 + 4 = \underline{\hspace{2cm}}$ $16 \div 4 + 4 = \underline{\hspace{2cm}}$ Yes No

e. Multiply, then subtract. Subtract, then multiply. Same?
 $8 \times 4 - 2 = \underline{\hspace{2cm}}$ $8 \times 4 - 2 = \underline{\hspace{2cm}}$ Yes No

f. Multiply, then divide. Divide, then multiply. Same?
 $8 \cdot 4 \div 2 = \underline{\hspace{2cm}}$ $8 \cdot 4 \div 2 = \underline{\hspace{2cm}}$ Yes No

g. Subtract, then add. Add, then subtract. Same?
 $13 - 4 + 6 = \underline{\hspace{2cm}}$ $13 - 4 + 6 = \underline{\hspace{2cm}}$ Yes No

h. Multiply, then add. Add, then multiply. Same?
 $1 \times 2 + 3 = \underline{\hspace{2cm}}$ $1 \times 2 + 3 = \underline{\hspace{2cm}}$ Yes No

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2 **ACTIVITY:** Using Parentheses

Work with a partner. Use all the symbols and numbers to write an expression that has the given value.

<i>Symbols and Numbers</i>	<i>Value</i>	<i>Expression</i>
a. (), +, ÷, 3, 4, 5	3	_____
b. (), −, ×, 2, 5, 8	11	_____
c. (), ×, ÷, 4, 4, 16	16	_____
d. (), −, ÷, 3, 8, 11	1	_____
e. (), +, ×, 2, 5, 10	70	_____

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Numerical Expression

an expression that contains only
numbers and operations

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Evaluate

to find the value of

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Order of Operations

a set of rules to evaluate a
mathematical expression

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P.E.M.D.A.S.

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Key Idea

Order of Operations

1. Perform operations in **P**arentheses.
2. Evaluate numbers with **E**xponents.
3. **M**ultiply or **D**ivide from left to right.
4. **A**dd or **S**ubtract from left to right.

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1 Using Order of Operations

a. Evaluate $12 - 2 \times 4$.

$$\begin{aligned} 12 - 2 \times 4 &= 12 - 8 \\ &= 4 \end{aligned}$$

Multiply 2 and 4.

Subtract 8 from 12.

b. Evaluate $7 + 60 \div (3 \times 5)$.

$$\begin{aligned} 7 + 60 \div (3 \times 5) &= 7 + 60 \div 15 \\ &= 7 + 4 \\ &= 11 \end{aligned}$$

Perform operation in parentheses.

Divide 60 by 15.

Add 7 and 4.

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2 Using Order of Operations with Exponents

Evaluate $30 \div (7 + 2^3) \times 6$.

Evaluate the power in parentheses first.

$$\begin{aligned} 30 \div (7 + 2^3) \times 6 &= 30 \div (7 + 8) \times 6 \\ &= 30 \div 15 \times 6 \\ &= 2 \times 6 \\ &= 12 \end{aligned}$$

Evaluate 2^3 .

Perform operation in parentheses.

Divide 30 by 15.

Multiply 2 and 6.

$$9^2 - (3^3 + \cancel{(2+3)^2} + 10) + 50$$

$$9^2 - (\cancel{3^3} + \cancel{5^2} + 10) + 50$$

$$9^2 - (\cancel{27} + \cancel{25} + \cancel{10}) + 50$$

$$9^2 - 62 + 50$$

$$81 - 62 + 50$$

$$19 + 50$$

$$\boxed{69}$$

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On Your Own

Evaluate the expression.

1. $7 \cdot 5 + 3$

2. $(28 - 20) \div 4$

3. $6 \times 15 - 10 \div 2$

4. $6 + 2^4 - 1$

5. $4 \cdot 3^2 + 18 - 9$

6. $16 + (5^2 - 7) \div 3$

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3

Using Order of Operations

a. Evaluate $9 + 7(5 - 2)$.

$$\begin{aligned} 9 + 7(5 - 2) &= 9 + 7(3) \\ &= 9 + 21 \\ &= 30 \end{aligned}$$

Perform operation in parentheses.

Multiply 7 and 3.

Add 9 and 21.

b. Evaluate $15 - 4(6 + 1) \div 2^2$.

$$\begin{aligned} 15 - 4(6 + 1) \div 2^2 &= 15 - 4(7) \div 2^2 \\ &= 15 - 4(7) \div 4 \\ &= 15 - 28 \div 4 \\ &= 15 - 7 \\ &= 8 \end{aligned}$$

Perform operation in parentheses.

Evaluate 2^2 .

Multiply 4 and 7.

Divide 28 by 4.

Subtract 7 from 15.

On Your Own

Evaluate the expression.

7. $50 + 6(12 \div 4) - 8^2$ 8. $5^2 - 5(10 - 5)$ 9. $\frac{8(3 + 4)}{7}$

10. **WHAT IF?** In Example 4, you add the dwarf planet Pluto to your model. Use a verbal model to find your total cost assuming you do not need more paint. Explain.

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Assignment

Complete problems 6, 10, 14, 18, 19, & 30
on pages 20 & 21 in your Big Ideas Text
Book.

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Homework

Worksheet 1.2 Practice A