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

Warm Up

$4)\overline{2348}$ $\qquad$ $4)\overline{2980}$ $\qquad$ $3)\overline{2163}$ $\qquad$ $6)\overline{744}$ $\qquad$ $4)\overline{1528}$

$7)\overline{2569}$ $\qquad$ $2)\overline{662}$ $\qquad$ $2)\overline{1840}$ $\qquad$ $4)\overline{3992}$ $\qquad$ $9)\overline{7641}$

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Warm Up Answers

$$\begin{array}{r} 587 \\ 4\overline{)2348} \end{array}$$

$$\begin{array}{r} 745 \\ 4\overline{)2980} \end{array}$$

$$\begin{array}{r} 721 \\ 3\overline{)2163} \end{array}$$

$$\begin{array}{r} 124 \\ 6\overline{)744} \end{array}$$

$$\begin{array}{r} 382 \\ 4\overline{)1528} \end{array}$$

$$\begin{array}{r} 367 \\ 7\overline{)2569} \end{array}$$

$$\begin{array}{r} 331 \\ 2\overline{)662} \end{array}$$

$$\begin{array}{r} 920 \\ 2\overline{)1840} \end{array}$$

$$\begin{array}{r} 998 \\ 4\overline{)3992} \end{array}$$

$$\begin{array}{r} 849 \\ 9\overline{)7641} \end{array}$$

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Lesson 1.3

September 13, 14 & 15, 2016

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

Lesson 1.3   September 13, 14 & 15, 2016

Lesson Objective:

Students will be able to:

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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?

$3 + 4 \times 2 =$ _____ $3 + 4 \times 2 =$ _____   Yes   No

b. Add, then subtract.   Subtract, then add.   Same?

$5 + 3 - 1 =$ _____ $5 + 3 - 1 =$ _____   Yes   No

c. Divide, then multiply.   Multiply, then divide.   Same?

$12 \div 3 \bullet 2 =$ _____ $12 \div 3 \bullet 2 =$ _____   Yes   No

d. Divide, then add.   Add, then divide.   Same?

$16 \div 4 + 4 =$ _____ $16 \div 4 + 4 =$ _____   Yes   No

e. Multiply, then subtract.   Subtract, then multiply.   Same?

$8 \times 4 - 2 =$ _____ $8 \times 4 - 2 =$ _____   Yes   No

f. Multiply, then divide.   Divide, then multiply.   Same?

$8 \bullet 4 \div 2 =$ _____ $8 \bullet 4 \div 2 =$ _____   Yes   No

g. Subtract, then add.   Add, then subtract.   Same?

$13 - 4 + 6 =$ _____ $13 - 4 + 6 =$ _____   Yes   No

h. Multiply, then add.   Add, then multiply.   Same?

$1 \times 2 + 3 =$ _____ $1 \times 2 + 3 =$ _____   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.

Symbols and Numbers	*Value*	*Expression*
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	_____

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

Numerical Expression

an expression that contains only
numbers and operations

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 $12 - 2 \times 4$.

$$12 - 2 \times 4 = 12 - 8 \qquad \text{Multiply 2 and 4.}$$

$$= 4 \qquad \text{Subtract 8 from 12.}$$

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

$$7 + 60 \div (3 \times 5) = 7 + 60 \div 15 \qquad \text{Perform operation in parentheses.}$$

$$= 7 + 4 \qquad \text{Divide 60 by 15.}$$

$$= 11 \qquad \text{Add 7 and 4.}$$

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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.

$30 \div (7 + 2^3) \times 6 = 30 \div (7 + 8) \times 6$ Evaluate 2^3.

$= 30 \div 15 \times 6$ Perform operation in parentheses.

$= 2 \times 6$ Divide 30 by 15.

$= 12$ Multiply 2 and 6.

$$9^2 - (3^3 + (2+3)^2 + 10) + 50$$

$$9^2 - (3^3 + 5^2 + 10) + 50$$

$$9^2 - (27 + 25 + 10) + 50$$

$$9^2 - 62 + 50$$

$$9^2 - 62 + 50$$

$$81 - 62 + 50$$

$$19 + 50$$

$$\boxed{69}$$

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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 $9 + 7(5 - 2)$.**

$9 + 7(5 - 2) = 9 + 7(3)$	Perform operation in parentheses.
$= 9 + 21$	Multiply 7 and 3.
$= 30$	Add 9 and 21.

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

$15 - 4(6 + 1) \div 2^2 = 15 - 4(7) \div 2^2$	Perform operation in parentheses.
$= 15 - 4(7) \div 4$	Evaluate 2^2.
$= 15 - 28 \div 4$	Multiply 4 and 7.
$= 15 - 7$	Divide 28 by 4.
$= 8$	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.** $\dfrac{8(3 + 4)}{7}$

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.

Assignment

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

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Homework

No Homework