

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

# WarmUp

$$24 \overline{)1104}$$

$$91 \overline{)4823}$$

$$57 \overline{)912}$$

$$20 \overline{)680}$$

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# WarmUpAnswers

$$\begin{array}{r} 46 \\ 24 \overline{)1104} \end{array}$$

$$\begin{array}{r} 53 \\ 91 \overline{)4823} \end{array}$$

$$\begin{array}{r} 16 \\ 57 \overline{)912} \end{array}$$

$$\begin{array}{r} 34 \\ 20 \overline{)680} \end{array}$$

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# HomeworkAnswers

## 1.2 Record and Practice Journal

Write the product as a power.

1.  $5 \times 5 \times 5$

$5^3$

2.  $13 \times 13$

$13^2$

3.  $8 \cdot 8 \cdot 8 \cdot 8 \cdot 8 \cdot 8$

$8^6$

4.  $12 \cdot 12 \cdot 12 \cdot 12 \cdot 12$

$12^5$

5.  $10 \cdot 10 \cdot 10 \cdot 10$

$10^4$

6.  $17 \times 17 \times 17$

$17^3$

Find the value of the power.

7.  $4^4$

$256$

8.  $9^3$

$729$

9.  $24^2$

$576$

Determine whether the number is a perfect square.

10. 47

no

11. 16

yes

12. 121

yes

13. You complete 3 centimeters of a necklace in an hour. Each hour after the first, you triple the length of the necklace. Write an expression using exponents for the length of the necklace after 3 hours. Then find the length.

$3^3$ ; 27 cm

$3 \times 3 \times 3$   
 $3^3$

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## Lesson 1.3

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

Lesson 1.3

September 8, 2014

## **Lesson Objective:**

Students will be able to:

use the order of operations to evaluate 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.
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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?  
 $3 + 4 \times 2 = \underline{\quad}$        $3 + 4 \times 2 = \underline{\quad}$       Yes    No

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

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

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

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

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

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

h. Multiply, then add.      Add, then multiply.      Same?  
 $1 \times 2 + 3 = \underline{\quad}$        $1 \times 2 + 3 = \underline{\quad}$       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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# NumericalExpression

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.

$$7 + 60 \div (3 \cdot 5)$$

$$7 + 60 \div 15$$

$$7 + 4$$

$$(11)$$



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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.

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

$$30 \div (7 + 8) \times 6$$

$$30 \div 15 \times 6$$

$$2 \times 6$$

$$12$$

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## OnYourOwn

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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## 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.

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## OnYourOwn

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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Lesson 1.3

September 8, 2014

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# Homework

In your Big Ideas Record and Practice  
Journal page 14.