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

Warm Up

$24\overline{)1104}$ $91\overline{)4823}$

$57\overline{)912}$ $20\overline{)680}$

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Warm Up Answers

$$24\overline{)1104} = 46 \qquad 91\overline{)4823} = 53$$

$$57\overline{)912} = 16 \qquad 20\overline{)680} = 34$$

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Homework Answers

1.2 Record and Practice Journal

Write the product as a power.

1. $5 \times 5 \times 5$
   5^3
2. 13×13
   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

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Lesson 1.3

September 15, 2015

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

Lesson 1.3

September 15, 2015

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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.

September 15, 2015 TPA Lesson 1.3

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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	_____

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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 Parentheses.
2. Evaluate numbers with Exponents.
3. Multiply or Divide from left to right.
4. Add or Subtract from left to right.

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1 Using Order of Operations

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

$12 - 2 \times 4 = 12 - 8$ Multiply 2 and 4.

$= 4$ Subtract 8 from 12.

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

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

$= 7 + 4$ Divide 60 by 15.

$= 11$ 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.

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

$$= 30 \div 15 \times 6 \quad \text{Perform operation in parentheses.}$$

$$= 2 \times 6 \quad \text{Divide 30 by 15.}$$

$$= 12 \quad \text{Multiply 2 and 6.}$$

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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.

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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

In your Big Ideas Record and Practice Journal page 14.