



Objective Creating Numeric Expressions

## Warm-Up



Write each power of ten as a product of factors. Then calculate the product.

1.  $10^6 =$  \_\_\_\_\_  $=$  \_\_\_\_\_

2.  $10^9 =$  \_\_\_\_\_  $=$  \_\_\_\_\_

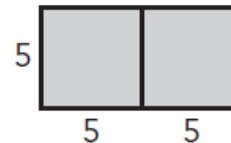
3.  $10^6 =$  \_\_\_\_\_  $=$  \_\_\_\_\_

4.  $10^8 =$  \_\_\_\_\_  $=$  \_\_\_\_\_



Consider the numeric expression  $2 \cdot 5^2$ .

1. Shae drew a model to represent the expression. Explain how Shae's model represents the expression. Then evaluate the expression.



2. Doug and Miguel each evaluated the expression differently.

Miguel

$$2 \cdot 5^2$$

$$5^2 = 25$$

$$2 \cdot 25 = 50$$

Doug

$$2 \cdot 5^2$$

$$2 \cdot 5 = 10$$

$$10^2 = 100$$

a. What does Miguel's solution tell you about how to evaluate a numeric expression with both multiplication and exponents?

b. Draw a model to represent Doug's solution. Explain how the model is different from Shae's.

Parentheses are symbols used to group numbers and operations. You can think about expressions inside parentheses as a single value.

3. This model represents the expression  $(6 + 4) \cdot 3$ .

a. Evaluate the expression represented by the model.

6	4
6	4
6	4

b. Draw a model that would represent the expression  $6 + (4 \cdot 3)$  and evaluate the expression.

c. Compare the models and the expressions. How does moving the parentheses change how you draw the model and how you evaluate the expression?

4. Consider the numeric expression  $(5 + 3)^2$ .

a. Draw a model to represent this expression.

b. The numeric expression was evaluated in two different ways, resulting in two different values. Determine which solution is correct. Explain why one solution is correct and state the error that was made in the other solution.

**Solution A**

$$\begin{aligned}(5 + 3)^2 \\ &= 8^2 \\ &= 64\end{aligned}$$

**Solution B**

$$\begin{aligned}(5 + 3)^2 \\ &= 25 + 9 \\ &= 34\end{aligned}$$

5. Consider the numeric expression  $3 \cdot (7 - 2)$ .

a. Draw a model to represent this expression.

b. The numeric expression was evaluated in two different ways, resulting in two different values. Determine which solution is correct. Explain why one solution is correct and state the error that was made in the other solution. Cross out the incorrect solution.

**Solution A**

$$\begin{aligned} &3 \cdot (7 - 2) \\ &= 21 - 2 \\ &= 19 \end{aligned}$$

**Solution B**

$$\begin{aligned} &3 \cdot (7 - 2) \\ &= 3(5) \\ &= 15 \end{aligned}$$

6. A band is playing at a local restaurant for a total of 8 Fridays and will be paid after their last performance. The band advertises their 8 appearances in the local newspaper for a total cost of \$400. If the band makes \$500 for each appearance, which numeric expression correctly shows the amount of money each of the four members will earn? Explain your reasoning.

**Expression A**

$$(8 \cdot 500 - 400) \div 4$$

**Expression B**

$$8 \cdot 500 - 400 \div 4$$



There is an Order of Operations, an order in which operations are performed when evaluating any numeric expression. The Order of Operations is a set of rules that ensures the same result every time an expression is evaluated.

### Order of Operations Rules

1. Evaluate expressions inside parentheses or grouping symbols.
2. Evaluate exponents.
3. Multiply and divide from left to right.
4. Add and subtract from left to right.

Keep in mind that multiplication and division are of equal importance and evaluated in order from left to right. The same is true for addition and subtraction.

Evaluate each expression using the Order of Operations.

1.  $28 \div 2^2 - 36 \div 32$

2.  $12 + (25 \div 5)^2$

3.  $(12^2 - 48) \times 2$

4.  $168 \div 2^3 + 3^3 - 20$

5.  $10 \div (5 - 3) + 2^3$

## Show You KNOW

### Order of Operations

Determine whether or not each expression was evaluated correctly. Show the correct work for any incorrect answers.

1.  $18 \div 2 \cdot 32$

$$18 \div 2 \cdot 9$$

$$18 \div 18$$

$$1$$

2.  $(15 + 10 \div 5) + 8$

$$(15 + 2) + 8$$

$$17 + 8$$

$$25$$

3.  $60 - (10 - 6 + 1)2 \cdot 2$

$$60 - (10 - 7)^2 \cdot 2$$

$$60 - (3)^2 \cdot 2$$

$$60 - 9 \cdot 2$$

$$60 - 18$$

$$42$$

Each numeric expression has been evaluated correctly and incorrectly. For those that have been evaluated correctly, state how the Order of Operations was used to evaluate the expression. For those expressions that have been evaluated incorrectly, determine the error that was made.

4.  $2(10 - 1) 2 3 \cdot 2$

$$2(9) - 3 \cdot 2$$

$$18 - 3 \cdot 2$$

$$15 \cdot 2$$

$$30$$

$2(10 - 1) - 3 \cdot 2$

$$2(9) - 3 \cdot 2$$

$$18 - 6$$

$$12$$

5.  $4 + 3^2$

$$4 + 9$$

$$13$$

$4 + 3^2$

$$72$$

$$49$$

6.  $(2 + 6)^2$

$$8^2$$

$$64$$

$(2 + 6)^2$

$$4 + 36$$

$$40$$





## LESSON 7.1b

# Relationships Matter



Objective

Creating Numeric Expressions

## Practice

Use the Order of Operations to evaluate each numeric expression.

1.  $4^2 \cdot 3$

2.  $3^3 - 14 \div 2 + 5$

3.  $17 - 2^3$

4.  $144 \div 6^2 \cdot 8 + 2^2$

5.  $32 \div 4^2$

6.  $2^4 - 3 \cdot 5 + 9$

7.  $9 + 5^2 - 2 \cdot 3^2$

8.  $11^2 - 7 \cdot 6 - 4^3 \div 2$

## Stretch

Evaluate each power raised to a power.

1.  $(3^2)^2$

2.  $(5^2)^4$

3.  $(4^3)^2$