



## Vocabulary

### Review

To *simplify* a numerical expression means to replace it with its single numerical value. Circle the *simplified form* of each expression.

1.  $2 \cdot 3 \cdot 4$

$4 \cdot 3 \cdot 2$

$6 \cdot 4$

9

24

2.  $\frac{1}{2} \cdot 36$

$36 \cdot \frac{1}{2}$

12

18

$36\frac{1}{2}$

3.  $16 - 4 + 7$

$16 - 7 + 4$

5

10

19

### Vocabulary Builder

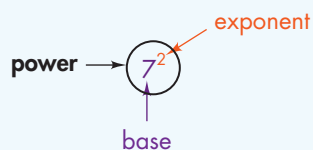
**power** (noun) POW er

**Related Words:** base, exponent

**Definition:** A **power** is a number that can be expressed using a base and an exponent.

**Main Idea:** **Powers** provide a shorthand way for showing repeated multiplication.

**Example:** The diagram above shows a **power**, its *base*, and its *exponent*. You can read the expression as, “seven to the second power.”



### Use Your Vocabulary

4. Circle the expression that shows a base of 7 and an exponent of 3.

$3^7$

$7(3)$

$7^3$

$\frac{3}{7}$

5. Underline the correct word to complete the sentence.

A(n) exponent / power is a number that can be expressed using a base and an exponent.

6. For each expression, underline the base, circle the exponent, and draw a box around the power.

$2^5$

$4^x$

$m^7$

$w^z$



## Problem 1 Simplifying Powers

**Got It?** What is the simplified form of  $3^4$ ?

7. Follow the steps to find the simplified form of the expression.

**1** Identify the base and the exponent in the expression  $3^4$ .  
 base:  exponent:

**2** Expand the expression to show the repeated multiplication indicated by the exponent.  
 $3^4 =$    $\cdot$    $\cdot$    $\cdot$

**3** Write the simplified form of the expression  $3^4$ .  
 $3^4 =$



### Key Concept Order of Operations

1. Perform any operation(s) inside grouping symbols, such as parentheses ( ) and brackets [ ]. A fraction bar also acts as a grouping symbol.
2. Simplify powers.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.



## Problem 2 Simplifying a Numerical Expression

**Got It?** What is the simplified form of  $5 \cdot 7 - 4^2 \div 2$ ?

8. Circle the part of the expression that you should simplify first.

$5 \cdot 7 - 4^2 \div 2$

9. Without simplifying the expression, explain how you know that subtraction will be the last operation.

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10. Simplify  $5 \cdot 7 - 4^2 \div 2$ . Show and justify each step.

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### Problem 3 Evaluating Algebraic Expressions

**Got It?** What is the value of the expression when  $a = 3$  and  $b = 4$ ?

$$3b - a^2$$

11.  $3b - a^2 = 3 \cdot \square - \square^2$       Substitute 3 for  $a$  and 4 for  $b$ .

12.  $= \square - \square^2$       Multiply.

13.  $= \square - \square$       Simplify the power.

14.  $= \square$       Subtract.



### Problem 4 Evaluating a Real-World Expression

**Got It?** The shipping cost for an order at an online store is  $\frac{1}{10}$  the cost of the items you order. What is an expression for the total cost of a given order? What are the total costs for orders of \$43, \$79, \$95, and \$103?

15. Complete the model.

Relate      total cost of an order is the cost of the items plus the shipping costs:  $\frac{1}{10}$  the cost of the items

Define      Let  $c$  = the cost of the items.

Write      total cost =  $\square$  +  $\frac{\square}{\square} \cdot \square$

16. Use the model to complete the table for each value of  $c$ .

Cost of Items	Shipping Cost	Total Cost of Order
\$43	$\frac{1}{10} \cdot \$43 = \$4.30$	$\$43 + \$4.30 = \$\square$
\$79	$\frac{1}{10} \cdot \$79 = \$\square$	$\$79 + \$7.90 = \$\square$
\$95	$\frac{1}{10} \cdot \$95 = \$\square$	$\$95 + \$\square = \$104.50$
\$103	$\frac{1}{10} \cdot \$103 = \$\square$	$\$103 + \$\square = \$\square$



## Lesson Check • Do you UNDERSTAND?

**Error Analysis** A student simplifies an expression as shown below. Find the error and simplify the expression correctly.

$$\begin{aligned}
 23 - 8 \cdot 2 + 3^2 &= 23 - 8 \cdot 2 + 9 \\
 &= 15 \cdot 2 + 9 \\
 &= 30 + 9 \\
 &= 39
 \end{aligned}$$

17. What operation did the student do first? Is this correct? Explain.

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18. What operation did the student do next? Is this correct? Explain.

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19. Now simplify the expression  $23 - 8 \cdot 2 + 3^2$  correctly.

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## Math Success

Check off the vocabulary words that you understand.

power

exponent

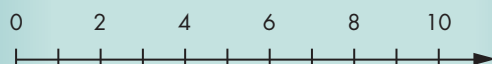
base

simplify

evaluate

Rate how well you can *evaluate expressions using the Order of Operations*.

Need to review



Now I get it!