Name _____ Class _____ Date _____

# Practice 3-3

## *Exponents and Multiplication*

**1.** Simplify $8^4 \cdot 8^2$ to an equivalent exponential expression.

**2.** Simplify the expression $(4x^5)(5x^6)$.

**3.** Simplify the expression $(6^9)^8$.

**4.** Simplify the expression $(x^{17})^2$.

**5.** Use the properties of exponents to rewrite the expression $(3 \cdot 6)^2$.

**6.** Simplify the expression $(3x^6)^2$.

**7. a) Reasoning** Simplify $x^{11} \cdot x^9$ and $x^{12} \cdot x^8$ to equivalent exponential expressions.

**b)** Does $x^{11} \cdot x^9 = x^{12} \cdot x^8$ for all values of x?

**c)** Give another way to justify your answer without doing any arithmetic.

**8. a) Multiple Representations** Simplify the expression $3^4 \cdot 3^5$. Write your answer using exponential notation. Simplify your answer.

**b)** What are three other ways to write the product as the multiplication of two powers?

❍ A. $3^5 \cdot 3^6$, $3^5 \cdot 3^7$, $3^2 \cdot 3^4$

❍ B. $3^4 \cdot 3^4$, $3^4 \cdot 3^6$, $3^4 \cdot 3^7$

❍ C. $3^5 \cdot 3^5$, $3^2 \cdot 3^5$, $3^3 \cdot 3^5$

❍ D. $3^5 \cdot 3^4$, $3^3 \cdot 3^6$, $3^2 \cdot 3^7$

**9. Error Analysis** Your teacher asks the class to evaluate the expression $(2^3)^1$. Your classmate gives an incorrect answer of 16.

**a)** Evaluate the expression.

**b)** What was the likely error?

❍ A. Your classmate divided the exponents.

❍ B. Your classmate multiplied the exponents.

❍ C. Your classmate added the exponents.

❍ D. Your classmate subtracted the exponents.

**10. a) Writing** Use a property of exponents to write $(3b)^5$ as a product of powers.

**b)** Describe the property of exponents that you used. In words, what does the power of a product equal?

**11. Flow Rate** A company manufactures faucets. It uses the expression $(4y^6)^3$ mm/s to calculate the maximum flow rate of water flowing out a spout with area $y^6$ mm$^2$. Use a property of exponents to simplify the flow-rate expression. Write your answer using exponential notation. Simplify your answer.

**12.** Simplify the expression.

$(-7y^3)(5y^2)$

**13.** Simplify the expression. Choose the correct answer below.

$(3fg)^9$

- ❍ A. $(3fg)^9 = 19{,}683fg^9$
- ❍ B. $(3fg)^9 = 59{,}049g^{10}f^{10}$
- ❍ C. $(3fg)^9 = 6{,}561g^8f^8$
- ❍ D. $(3fg)^9 = 19{,}683f^9g^9$

**14. Think About the Process**

**a)** How do you multiply powers that have the same base?

- ❍ A. Divide the exponents.
- ❍ B. Subtract the exponents.
- ❍ C. Multiply the exponents.
- ❍ D. Add the exponents.

**b)** Simplify the expression $x^7 \cdot x^5 \cdot x^4$.

**15. Think About the Process**

**a)** What do you do to find the power of a power?

- ❍ A. Divide the exponents.
- ❍ B. Subtract the exponents.
- ❍ C. Add the exponents.
- ❍ D. Multiply the exponents.

**b)** Simplify the expression $(x^3)^7$.

## *Practice 3-3:* ***Exponents and Multiplication***

**1.** $8^6$

**2.** $20x^{11}$

**3.** $6^{72}$

**4.** $x^{34}$

**5.** $3^2 \bullet 6^2$

**6.** $9x^{12}$

**7. a)** $x^{20}$

**b)** Yes

**c)** Answers will vary

**8. a)** $3^9$

**b)** D

**9. a)** 8

**b)** C

**10. a)** $(3b)^5 = 3^5b^5$

**b)** Answers will vary

**11.** $64y^{18}$

**12.** $-35y^5$

**13.** D

**14. a)** D

**b)** $x^{16}$

**15. a)** D

**b)** $x^{21}$