NAME _____ DATE _____

8-1 Powers and Exponents (Pages 336–340)

Perfect squares are the product of a number and itself. For example, 9 is a perfect square because $3 \times 3 = 9$. The expression 3×3 can be written using an **exponent**. An exponent tells how many times a number, called the **base**, is used as a factor. Numbers that are expressed using exponents are called **powers**.

Symbols	Words	Meaning
3^1	3 to the first power	3
w^2	w to the second power or w squared	$w \cdot w$
3^5	3 to the fifth power	$3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$
$4s^3$	4 times s to the third power or 4 times s cubed	$4 \cdot s \cdot s \cdot s$
$(3)^2(-4)^3$	3 squared times minus 4 cubed	$(3)(3)(-4)(-4)(-4)$
$7 \cdot 2^4$	7 times 2 to the fourth power	$7 \cdot 2 \cdot 2 \cdot 2 \cdot 2$
$(a + b)^3$	The quantity $a + b$ to the third power	$(a + b)(a + b)(a + b)$

EXAMPLE

Evaluate $3m^2 + n^3$ if $m = 6$ and $n = -2$.

$3m^2 + n^3 = 3(6)^2 + (-2)^3$ *Replace m with 6 and n with −2.*

$= 3(36) + (-8)$ $6^2 = 36, (-2)^3 = -8$

$= 108 - 8$ or 100

PRACTICE

Write each expression using exponents.

1. $8 \cdot 8 \cdot 8 \cdot 8$

2. $a \cdot a \cdot a \cdot a \cdot a$

3. 9

4. $5 \cdot x \cdot x \cdot x \cdot y \cdot y$

5. $(-7)(-7)(-7)(-2)(-2)$

6. 4 cubed

Write each power as a multiplication expression.

7. 6^5

8. g^4

9. $4n^2$

10. $2pq^3$

11. $(-5y)^2$

12. $9 \cdot 4^3$

Evaluate each expression if x = 4, y = −3, and z = 2.

13. x^2

14. $3y^2$

15. yz^5

16. $x + z^4$

17. $2(x + y)^5$

18. $2x^3 + 4z$

19. **Standardized Test Practice** Evaluate $x^4 + y^3$ if $x = 2$ and $y = 5$.

A 14 **B** 23 **C** 141 **D** 7^7

Answers: **1.** 8^4 **2.** a^5 **3.** 9^1 **4.** $5x^3y^2$ **5.** $(-7)^3(-2)^2$ **6.** 4^3 **7.** $6 \cdot 6 \cdot 6 \cdot 6 \cdot 6$ **8.** $g \cdot g \cdot g \cdot g$ **9.** $4 \cdot n \cdot n$ **10.** $2 \cdot p \cdot q \cdot q$ **11.** $(-5y)(-5y)$ **12.** $9 \cdot 4 \cdot 4 \cdot 4$ **13.** 16 **14.** 27 **15.** −96 **16.** 20 **17.** 2 **18.** 136 **19.** C