

7.1 EXERCISES

HOMEWORK KEY

- = See WORKED-OUT SOLUTIONS Exs. 31 and 55
- ★ = STANDARDIZED TEST PRACTICE Exs. 2, 40, 41, 50, and 58
- ◆ = MULTIPLE REPRESENTATIONS Ex. 55

SKILL PRACTICE

- VOCABULARY** Copy and complete: The ? of the quantity 93,534,004 people is the power of 10 nearest the quantity, or 10^8 people.
- ★ **WRITING** Explain when and how to use the product of powers property.

EXAMPLES

1, 2, 3, and 4

for Exs. 3–41

SIMPLIFYING EXPRESSIONS Simplify the expression. Write your answer using exponents.

- | | | | |
|-----------------------|-----------------------|----------------------------|---------------------------|
| 3. $4^2 \cdot 4^6$ | 4. $8^5 \cdot 8^2$ | 5. $3^3 \cdot 3$ | 6. $9 \cdot 9^5$ |
| 7. $(-7)^4(-7)^5$ | 8. $(-6)^6(-6)$ | 9. $2^4 \cdot 2^9 \cdot 2$ | 10. $(-3)^2(-3)^{11}(-3)$ |
| 11. $(3^5)^2$ | 12. $(7^4)^3$ | 13. $[(-5)^3]^4$ | 14. $[(-8)^9]^2$ |
| 15. $(15 \cdot 29)^3$ | 16. $(17 \cdot 16)^4$ | 17. $(132 \cdot 9)^6$ | 18. $((-14) \cdot 22)^5$ |

3-38

SIMPLIFYING EXPRESSIONS Simplify the expression.

- | | | | |
|----------------------------|----------------------------------|-----------------------------|----------------------------------|
| 19. $x^4 \cdot x^2$ | 20. $y^9 \cdot y$ | 21. $z^2 \cdot z \cdot z^3$ | 22. $a^4 \cdot a^3 \cdot a^{10}$ |
| 23. $(x^5)^2$ | 24. $(y^4)^6$ | 25. $[(b-2)^2]^6$ | 26. $[(d+9)^7]^3$ |
| 27. $(-5x)^2$ | 28. $-(5x)^2$ | 29. $(7xy)^2$ | 30. $(5pq)^3$ |
| 31. $(-10x^6)^2 \cdot x^2$ | 32. $(-8m^4)^2 \cdot m^3$ | 33. $6a^2 \cdot (2a^5)^4$ | 34. $(-20x^3)^2(-x^7)$ |
| 35. $-(2p^4)^3(-1.5p^7)$ | 36. $(\frac{1}{2}y^5)^3(2y^2)^4$ | 37. $(3x^5)^3(2x^7)^2$ | 38. $(-10n)^2(-4n^3)^3$ |

39. **ERROR ANALYSIS** Describe and correct the error in simplifying $c \cdot c^4 \cdot c^5$.

$$\begin{aligned}
 c \cdot c^4 \cdot c^5 &= c^1 \cdot c^4 \cdot c^5 \\
 &= c^{1 \cdot 4 \cdot 5} \\
 &= c^{20}
 \end{aligned}$$



40

- ★ **MULTIPLE CHOICE** Which expression is equivalent to $(-9)^6$?
 (A) $(-9)^2(-9)^3$ (B) $(-9)(-9)^5$ (C) $[(-9)^4]^2$ (D) $[(-9)^3]^3$
- ★ **MULTIPLE CHOICE** Which expression is equivalent to $36x^{12}$?
 (A) $(6x^3)^4$ (B) $12x^4 \cdot 3x^3$ (C) $3x^3 \cdot (4x^3)^3$ (D) $(6x^5)^2 \cdot x^2$

SIMPLIFYING EXPRESSIONS Find the missing exponent.

- | | | | |
|---------------------------|------------------------|--------------------------|-----------------------------------|
| 42. $x^4 \cdot x^? = x^5$ | 43. $(y^8)^? = y^{16}$ | 44. $(2z^3)^3 = 8z^{15}$ | 45. $(3a^3)^? \cdot 2a^3 = 18a^9$ |
|---------------------------|------------------------|--------------------------|-----------------------------------|

46. **POPULATION** The population of New York City in 2000 was 8,008,278. What was the order of magnitude of the population of New York City?

SIMPLIFYING EXPRESSIONS Simplify the expression.

- | | | |
|------------------------------|------------------------------|-------------------------------------|
| 47. $(-3x^2y)^3(11x^3y^5)^2$ | 48. $-(-xy^2z^3)^5(x^4yz)^2$ | 49. $(-2s)(-5r^3st)^3(-2r^4st^7)^2$ |
|------------------------------|------------------------------|-------------------------------------|