

# Practice 8-4

## More Multiplication Properties of Exponents

**Simplify each expression.**

- |                               |  |                            |
|-------------------------------|--|----------------------------|
| 1. $(4a^5)^3$                 | 2. $(2^{-3})^4$                        | 3. $(m^{-3}n^4)^{-4}$      |
| 4. $(x^5)^2$                  | 5. $2^5 \cdot (2^4)^2$                 | 6. $(4x^4)^3(2xy^3)^2$     |
| 7. $x^4 \cdot (x^4)^3$        | 8. $(x^5y^3)^3(xy^5)^2$                | 9. $(5^2)^2$               |
| 10. $(a^4)^{-5} \cdot a^{13}$ | 11. $(3f^4g^{-3})^3(f^2g^{-2})^{-1}$   | 12. $x^3 \cdot (x^3)^5$    |
| 13. $(d^2)^{-4}$              | 14. $(a^3b^4)^{-2}(a^{-3}b^{-5})^{-4}$ | 15. $(x^2y)^4$             |
| 16. $(12b^{-2})^2$            | 17. $(m^{-5})^{-3}$                    | 18. $(x^{-4})^5(x^3y^2)^5$ |
| 19. $(y^6)^{-3} \cdot y^{21}$ | 20. $n^6 \cdot (n^{-2})^5$             | 21. $(m^5)^{-3}(m^4n^5)^4$ |
| 22. $(a^3)^6$                 | 23. $b^{-9} \cdot (b^2)^4$             | 24. $(4^{-1}s^3)^{-2}$     |
| 25. $(5a^3b^5)^4$             | 26. $(b^{-3})^6$                       | 27. $(y^6)^3$              |
| 28. $a^{-4} \cdot (a^4b^3)^2$ | 29. $(x^4y)^3$                         | 30. $d^3 \cdot (d^2)^5$    |

**Simplify. Write each answer in scientific notation.**

- |                                       |                                       |                                    |
|---------------------------------------|---------------------------------------|------------------------------------|
| 31. $10^{-9} \cdot (2 \times 10^2)^2$ | 32. $(3 \times 10^{-6})^3$            | 33. $10^4 \cdot (4 \times 10^6)^3$ |
| 34. $(9 \times 10^7)^2$               | 35. $10^{-3} \cdot (2 \times 10^3)^5$ | 36. $(7 \times 10^5)^3$            |
| 37. $(5 \times 10^5)^4$               | 38. $(2 \times 10^{-3})^3$            | 39. $(5 \times 10^2)^{-3}$         |
| 40. $(3 \times 10^5)^4$               | 41. $(4 \times 10^8)^{-3}$            | 42. $(1 \times 10^{-5})^{-5}$      |
| 43. $10^5 \cdot (8 \times 10^7)^3$    | 44. $(10^2)^3(6 \times 10^{-3})^3$    | 45. $10^7 \cdot (2 \times 10^2)^4$ |
46. The kinetic energy, in joules, of a moving object is found by using the formula  $E = \frac{1}{2}mv^2$ , where  $m$  is the mass and  $v$  is the speed of the object. The mass of a car is  $1.59 \times 10^3$  kg. The car is traveling at  $2.7 \times 10^1$  m/s. What is the kinetic energy of the car?
47. The moon is shaped somewhat like a sphere. The surface area of the moon is found by using the formula  $S = 12.56r^2$ . What is the surface area of the moon if the radius is  $1.08 \times 10^3$  mi?
48. Because of a record corn harvest, excess corn is stored on the ground in a pile. The pile is shaped like a cone. The height of the pile is 25 ft, and the radius of the pile is  $1.2 \times 10^2$  ft. Use the formula  $V = \frac{1}{3}\pi r^2 h$  to find the volume.
49. Suppose the distance in feet that an object travels in  $t$  seconds is given by the formula  $d = 64t^2$ . How far would the object travel after  $1.5 \times 10^3$  seconds?

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