

## 10.1

## Multiplying Powers With the Same Base

Rewrite each expression using each base only once.

1.  $4^5 \cdot 4^3$

2.  $2^4 \cdot 2^6 \cdot 2^2$

3.  $5^6 \cdot 5^{-2} \cdot 5^{-1}$

4.  $10^{-4} \cdot 10^4 \cdot 10^2$

5.  $7^9 \cdot 7^3 \cdot 7^{-10}$

6.  $9^2 \cdot 9^{-8} \cdot 9^6$

Simplify each expression.

7.  $z^8 z^5$

8.  $-4k^{-3} \cdot 6k^4$

9.  $(-5b^3)(-3b^6)$

10.  $(13x^{-8})(3x^{10})$

11.  $(-2h^5)(4h^{-3})$

12.  $-8n \cdot 11n^9$

13.  $mn^2 \cdot m^2 n^{-4} \cdot mn^{-1}$

14.  $(6a^3 b^{-2})(-4ab^{-8})$

15.  $(12mn)(-m^3 n^{-2} p^5)(2m)$

Write each answer in scientific notation.

16. The population of a country in 1950 was  $6.2 \times 10^7$ . The population in 2030 is projected to be  $3 \times 10^2$  times the 1950 population. If the projection is correct, what will the population of the country be in 2030?

17. The area of land that Rhode Island covers is approximately  $1.5 \times 10^3$  square miles. The area of land that Alaska covers is a little more than  $4.3 \times 10^2$  times the land area of Rhode Island. What is the approximate area of Alaska in square miles?

Simplify each expression.

18.  $16^{\frac{1}{4}}$

19.  $125^{\frac{1}{3}}$

20.  $243^{\frac{1}{5}}$

21.  $8^{\frac{2}{3}}$

22.  $64^{\frac{4}{3}}$

23.  $25^{\frac{3}{2}}$

$$24. \left(7q^{\frac{4}{3}} \cdot 6r^{\frac{3}{5}}\right) \cdot \left(7q^{\frac{1}{3}} \cdot 6r^{\frac{1}{5}}\right) \quad 25. \left(3h^{\frac{5}{2}} \cdot 2k^{\frac{3}{4}}\right) \cdot \left(2k^{\frac{3}{2}} \cdot 3h^{\frac{5}{4}}\right) \quad 26. \left(8p^{\frac{1}{6}} \cdot 5m^{\frac{1}{2}}\right) \cdot \left(8p^{\frac{1}{4}} \cdot 5m^{\frac{5}{6}}\right)$$

Complete each equation.

27.  $9^{-2} \cdot 9^4 = 9^{\square}$

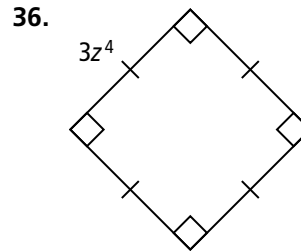
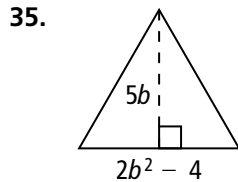
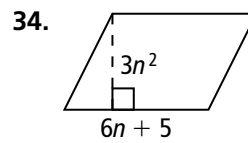
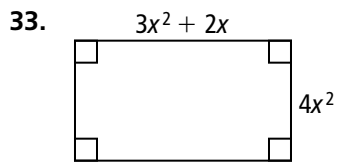
28.  $5^{\square} \cdot 5^3 = 5^2$

29.  $2^8 \cdot 2^{\square} = 2^{-2}$

30.  $z^{\square} \cdot z^{-5} = z^3$

31.  $m^{\frac{1}{3}} \cdot m^{\frac{1}{6}} \cdot m^{\square} = m^2$

32.  $d^7 \cdot d^{-13} \cdot d^{-9} = d^{\square}$



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

37.  $(7 \times 10^{17})(8 \times 10^{-28})$       38.  $(4 \times 10^{-11})(0.8 \times 10^7)$       39.  $(0.9 \times 10^{15})(0.1 \times 10^{-6})$
40.  $(0.8 \times 10^5)(0.6 \times 10^{-17})$       41.  $(0.5 \times 10^3)(0.6 \times 10^0)$       42.  $(0.2 \times 10^{11})(0.4 \times 10^{-14})$
43. The diameter of the moon is approximately  $3.5 \times 10^3$  kilometers.
- The diameter of Earth is approximately 3.7 times the diameter of the moon. Determine the diameter of Earth. Write your answer in scientific notation.
  - The distance from the center of Earth to the center of the moon is approximately 30 times the diameter of Earth. Determine the distance from the center of Earth to the center of the moon. Write your answer in scientific notation.

**Simplify each expression.**

44.  $\frac{1}{n^{-8} \cdot n^3}$       45.  $\frac{1}{x^4 \cdot x^{-9}}$       46.  $7k^4(-2k^6 - k)$
47.  $-2x^2\left(-3x^{\frac{1}{2}} + 5\right)$       48.  $4^x \cdot 4^{x+1} \cdot 4$       49.  $(n + 2)^5(n + 2)^{-3}$

50. **Writing** Explain what moving the decimal point 4 places to the right or to the left does to the value of a number. In scientific notation, what power of 10 would you multiply by to move the decimal point 4 places to the right or to the left?