

Lesson 9.1 Multiplying and Dividing Powers

A number multiplied by itself can be written as follows:

$$10 \times 10 \times 10 \times 10 = 10^4 = 10,000$$

↙ exponent
↘
↙ base
↘
↑ product

10^4 is read as "10 to the 4th power."

$$n^0 = 1 \quad n^1 = n \quad n^2 = n \times n \text{ (or "n squared")} \quad n^3 = n \times n \times n \text{ (or "n cubed")}$$

Use **exponents** to show how numbers with the same base are multiplied and divided:

$5^3 \times 5^3$ can be expressed as $5^{3+3} = 5^6$ because it means $(5 \times 5 \times 5) \times (5 \times 5 \times 5)$.

$10^6 \div 10^2$ can be expressed as $10^{6-2} = 10^4$ because it means $(10 \times 10 \times 10 \times 10 \times 10 \times 10) \div (10 \times 10)$.

Rewrite each multiplication or division expression using a base and an exponent.

a

1. $4^3 \times 4^5 =$ _____
2. $(3 \times 3 \times 3) \times (3 \times 3) =$ _____
3. $8^5 \div 8 =$ _____
4. $(5 \times 5) \times (5 \times 5) =$ _____
5. $10^3 \times 10 =$ _____
6. $4^3 \div 4^2 =$ _____
7. $11^5 \times 11^2 =$ _____
8. $(8 \times 8 \times 8 \times 8) \div (8 \times 8) =$ _____
9. $12^9 \times 12^2 =$ _____
10. $3^4 \times 3^4 =$ _____
11. $(5 \times 5 \times 5) \div 5 =$ _____
12. $4^{12} \div 4^6 =$ _____

b

1. $9^2 \times 9^3 =$ _____
2. $5^6 \div 5^3 =$ _____
3. $(2 \times 2 \times 2 \times 2) \div (2 \times 2) =$ _____
4. $9^9 \div 9^5 =$ _____
5. $6^5 \div 6^2 =$ _____
6. $(7 \times 7 \times 7) \div 7 =$ _____
7. $6 \times 6^5 =$ _____
8. $5^3 \times 5^2 =$ _____
9. $11^{10} \div 11^4 =$ _____
10. $(4 \times 4 \times 4 \times 4) \div 4 =$ _____
11. $6^8 \times 6^4 =$ _____
12. $3^3 \times 3^9 =$ _____