

SPECTRUM[®]

Math

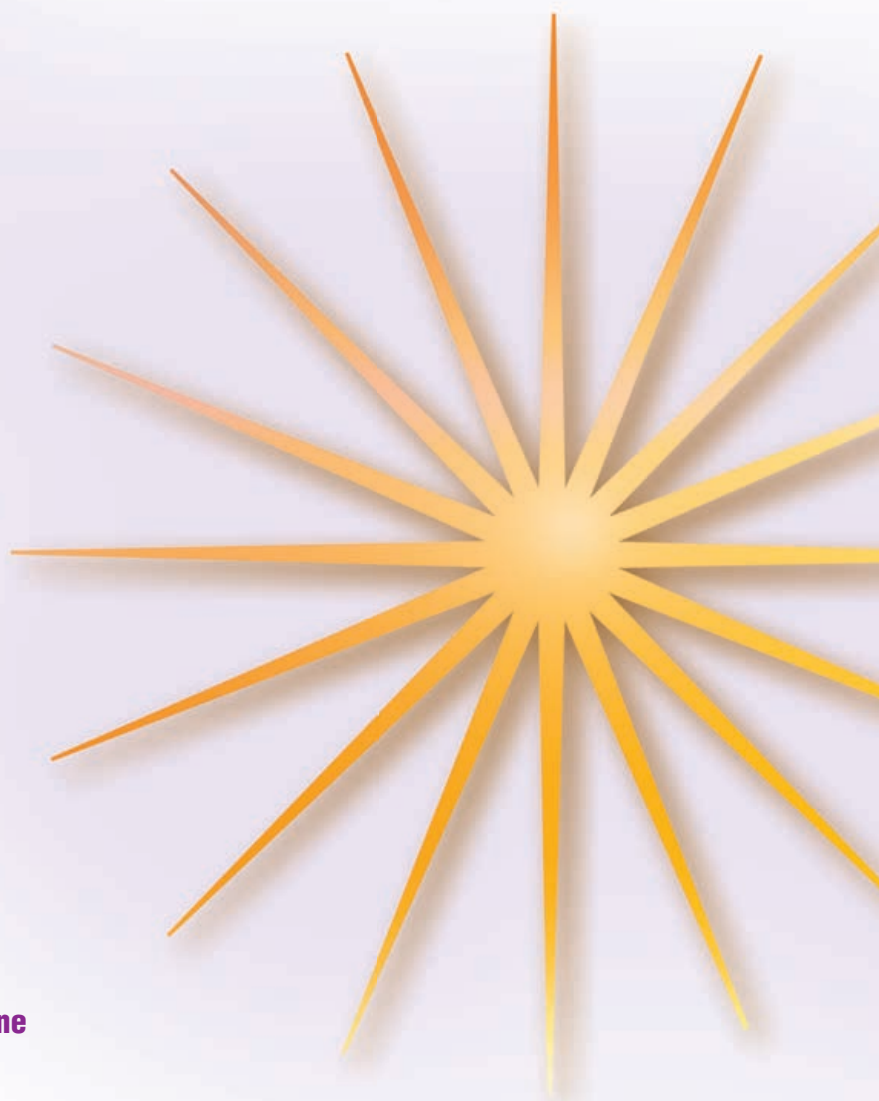
GRADE

8



Focused Practice for Math Mastery

- Rational and irrational numbers
- Linear equations
- Pythagorean Theorem
- Geometry in the coordinate plane
- Probability and statistics
- Answer key



**Check What You Know****Integers and Exponents**

Find the value of each expression.

a

1. $7^3 =$ _____

2. $9^4 =$ _____

3. $4^{-3} =$ _____

4. $2^{-5} =$ _____

5. $7^4 =$ _____

b

$8^5 =$ _____

$1^5 =$ _____

$3^{-5} =$ _____

$9^{-3} =$ _____

$3^{-4} =$ _____

c

$4^2 =$ _____

$6^8 =$ _____

$7^{-4} =$ _____

$10^{-3} =$ _____

$5^9 =$ _____

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

6. $4^5 \div 4^2 =$ _____

$6^{-5} \times 6^3 =$ _____

$8^{-4} \div 8^{-2} =$ _____

7. $9^{11} \div 9^6 =$ _____

$5^{-3} \times 5^{-1} =$ _____

$3^{-6} \div 3^4 =$ _____

8. $8^2 \times 8^3 =$ _____

$6^4 \times 6^7 =$ _____

$4^{-2} \div 4^{-5} =$ _____

9. $7^6 \div 7^3 =$ _____

$4^8 \times 4^3 =$ _____

$9^5 \times 9^6 =$ _____

10. $2^9 \div 2^{-3} =$ _____

$3^8 \div 3^2 =$ _____

$12^4 \times 12^{10} =$ _____

11. $5^4 \times 5^2 =$ _____

$10^7 \div 10^4 =$ _____

$11^3 \times 11^4 =$ _____

12. $7^5 \div 7^2 =$ _____

$6^6 \times 6^3 =$ _____

$12^4 \div 12^2 =$ _____



Check What You Know

Integers and Exponents

Rewrite each in standard notation.

a

13. 9.545×10^3

14. 8.124×10^6

15. 1.0428×10^4

16. 2.396×10^5

17. 3.957×10^2

b

8.596×10^{-3}

8.743×10^4

7.8543×10^{-2}

8.352×10^{-6}

9.389×10^6

c

9.318×10^{-3}

2.961×10^5

4.937×10^{-4}

3.85×10^7

4.109×10^{-5}

Rewrite each in scientific notation.

18. 0.4537

19. 0.7614

20. 892,320

21. 783,000

22. 53,890,000

0.006686

0.01087

428,200

0.0004642

4,183,200,000

133,300

517,700

0.01283

478,200,000

0.00028737

Lesson 1.1 Using Exponents

A **power** of a number represents repeated multiplication of the number by itself.

$6^4 = 6 \times 6 \times 6 \times 6$ and is read *6 to the fourth power*.

In exponential numbers, the **base** is the number that is multiplied, and the **exponent** represents the number of times the base is used as factor. In 6^4 , 6 is the base and 4 is the exponent.

5^5 means 5 is used as a factor 5 times.

$$5 \times 5 \times 5 \times 5 \times 5 = 3,125 \qquad 5^5 = 3,125$$

Write each power as a product of the factors.

- | a | b | c |
|-------------------|-------------|-------------|
| 1. 3^3 _____ | 5^5 _____ | 6^1 _____ |
| 2. 2^{12} _____ | 3^8 _____ | 3^6 _____ |
| 3. 4^7 _____ | 4^4 _____ | 8^3 _____ |

Use exponents to rewrite these expressions.

- | a | b |
|---|--------------------------------------|
| 4. $24 \times 24 \times 24$ _____ | $2 \times 2 \times 2 \times 2$ _____ |
| 5. $3 \times 3 \times 3 \times 3 \times 3$ _____ | 5×5 _____ |
| 6. $5 \times 5 \times 5 \times 5 \times 5 \times 5$ _____ | $4 \times 4 \times 4$ _____ |

Find the value of each expression.

- | a | b | c |
|------------------|---------------|----------------|
| 7. $8^3 =$ _____ | $9^4 =$ _____ | $10^2 =$ _____ |

Lesson 1.1 Using Exponents

Write each power as a product of the factors.

a**b****c**

1. 9^2 _____

58^1 _____

4^3 _____

2. 5^4 _____

8^2 _____

3^4 _____

3. 75^2 _____

6^2 _____

10^{10} _____

Use exponents to rewrite these expressions.

a**b**

4. 8 _____

13×13 _____

5. $6 \times 6 \times 6 \times 6$ _____

$5 \times 5 \times 5 \times 5$ _____

6. $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$ _____

$3 \times 3 \times 3$ _____

7. $86 \times 86 \times 86$ _____

$4 \times 4 \times 4 \times 4 \times 4$ _____

8. $10 \times 10 \times 10 \times 10 \times 10$ _____

$15 \times 15 \times 15 \times 15 \times 15$ _____

Find the value of each expression.

a**b****c**

9. $7^1 =$ _____

$3^4 =$ _____

$10^5 =$ _____

10. $7^5 =$ _____

$5^3 =$ _____

$8^4 =$ _____

11. $4^2 =$ _____

$2^5 =$ _____

$9^7 =$ _____

12. $6^4 =$ _____

$12^3 =$ _____

$7^3 =$ _____

Lesson 1.2 Equivalent Expressions with Exponents

To multiply powers with the same base, combine bases, add the exponents, then simplify.

$$2^2 \times 2^3 = 2^{2+3} = 2^5 = 32$$

To divide powers with the same base, combine bases, subtract the exponents, then simplify.

$$3^5 \div 3^2 = 3^{5-2} = 3^3 = 27$$

Find the value of each expression.

a**b****c**

1. $7^2 =$ _____

$8^3 =$ _____

$4^3 =$ _____

2. $10^2 =$ _____

$9^4 =$ _____

$11^5 =$ _____

3. $17^3 =$ _____

$5^6 =$ _____

$6^4 =$ _____

4. $21^3 =$ _____

$16^4 =$ _____

$12^5 =$ _____

Rewrite each expression as one base and one exponent. Then, find the value.

5. $8^2 \times 8^3 =$ $8^5; 32768$

$3^3 \times 3^3 =$ _____

$2^2 \times 2^2 =$ _____

6. $7^4 \div 7^2 =$ _____

$9^5 \div 9^3 =$ _____

$16^4 \div 16^2 =$ _____

7. $6^4 \times 6^1 =$ _____

$4^4 \times 4^2 =$ _____

$3^2 \times 3^2 =$ _____

8. $10^6 \div 10^4 =$ _____

$8^3 \div 8^2 =$ _____

$7^6 \div 7^3 =$ _____

9. $5^3 \times 5^2 =$ _____

$10^3 \times 10^4 =$ _____

$15^2 \times 15^1 =$ _____

10. $2^8 \div 2^3 =$ _____

$3^9 \div 3^7 =$ _____

$6^6 \div 6^3 =$ _____

Lesson 1.2 Equivalent Expressions with Exponents

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

a**b**

1. $4^3 \times 4^5 =$ _____

$9^2 \times 9^3 =$ _____

2. $(3 \times 3 \times 3) \times (3 \times 3) =$ _____

$5^6 \div 5^3 =$ _____

3. $8^5 \div 8 =$ _____

$(2 \times 2 \times 2 \times 2) \div (2 \times 2) =$ _____

4. $(5 \times 5) \times (5 \times 5) =$ _____

$9^9 \div 9^5 =$ _____

5. $10^3 \times 10 =$ _____

$6^5 \div 6^2 =$ _____

6. $4^3 \div 4^2 =$ _____

$(7 \times 7 \times 7) \div 7 =$ _____

7. $11^5 \times 11^2 =$ _____

$6 \times 6^5 =$ _____

8. $(8 \times 8 \times 8 \times 8) \div (8 \times 8) =$ _____

$5^3 \times 5^2 =$ _____

9. $12^9 \times 12^2 =$ _____

$11^{10} \div 11^4 =$ _____

10. $3^4 \times 3^4 =$ _____

$(4 \times 4 \times 4 \times 4) \div 4 =$ _____

11. $(5 \times 5 \times 5) \div 5 =$ _____

$6^8 \times 6^4 =$ _____

12. $4^{12} \div 4^6 =$ _____

$3^3 \times 3^9 =$ _____

13. $(6 \times 6 \times 6 \times 6) \div (6 \times 6 \times 6) =$ _____

$15^8 \div 15^3 =$ _____

14. $9^9 \times 9^6 =$ _____

$7^8 \times 7^2 =$ _____

15. $2^7 \div 2 =$ _____

$4^{11} \times 4 =$ _____

Lesson 1.3 Negative Exponents

When a power includes a negative exponent, express the number as 1 divided by the base and change the exponent to positive.

$$\begin{aligned} 4^{-2} &= \frac{1}{4^2} \\ &= \frac{1}{16} \\ &= 0.0625 \end{aligned}$$

To multiply or divide powers with the same base, combine bases, add or subtract the exponents, and then simplify.

$$\begin{aligned} 2^{-3} \times 2^{-2} &= 2^{-5} = \frac{1}{2^5} = 0.03125 \\ 2^{-4} \div 2^{-2} &= 2^{-2} = \frac{1}{2^2} = 0.25 \end{aligned}$$

Rewrite each expression with a positive exponent. Then, solve. Round your answer to four decimal places.

- | a | b | c |
|---------------------|-------------------|------------------|
| 1. $3^{-2} =$ _____ | $6^{-3} =$ _____ | $8^{-2} =$ _____ |
| 2. $7^{-3} =$ _____ | $3^{-3} =$ _____ | $9^{-2} =$ _____ |
| 3. $4^{-3} =$ _____ | $5^{-2} =$ _____ | $2^{-3} =$ _____ |
| 4. $2^{-4} =$ _____ | $10^{-3} =$ _____ | $1^{-4} =$ _____ |

Find each product. Round your answer to five decimal places.

- | | | |
|-----------------------------------|--------------------------------|--------------------------------|
| 5. $4^{-2} \times 4^{-3} =$ _____ | $2^{-4} \times 2^{-1} =$ _____ | $3^{-2} \times 3^{-3} =$ _____ |
| 6. $6^{-2} \times 6^{-2} =$ _____ | $5^{-2} \times 5^{-4} =$ _____ | $3^{-2} \times 3^{-2} =$ _____ |
| 7. $8^{-6} \times 8^4 =$ _____ | $7^{-5} \times 7^2 =$ _____ | $2^{-7} \times 2^4 =$ _____ |

Find each quotient. Round your answer to five decimal places.

- | | | |
|---------------------------------|------------------------------|------------------------------|
| 8. $4^{-4} \div 4^{-2} =$ _____ | $8^{-5} \div 8^{-3} =$ _____ | $3^{-5} \div 3^{-2} =$ _____ |
| 9. $2^{-8} \div 2^{-4} =$ _____ | $5^{-6} \div 5^{-4} =$ _____ | $6^{-7} \div 6^{-4} =$ _____ |
| 10. $3^{-3} \div 3^2 =$ _____ | $4^{-3} \div 4^1 =$ _____ | $2^{-6} \div 2^{-3} =$ _____ |

Lesson 1.3 Negative Exponents

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

a**b**

1. $3^{-4} \times 3^{-6} =$ _____

$9^{-3} \div 9^{-5} =$ _____

2. $4^3 \div 4^{-2} =$ _____

$5^5 \times 5^{-6} =$ _____

3. $12^{-3} \times 12^{-4} =$ _____

$4^{-6} \times 4^4 =$ _____

4. $7^6 \div 7^{-3} =$ _____

$2^{-3} \div 2^3 =$ _____

5. $11^4 \times 11^{-3} =$ _____

$6^{-5} \times 6^{-4} =$ _____

6. $8^{-5} \div 8^3 =$ _____

$12^{-4} \div 12 =$ _____

7. $7^5 \times 7^{-4} =$ _____

$5^{-3} \times 5^2 =$ _____

8. $2^5 \div 2^{-3} =$ _____

$3^{-12} \times 3^{-4} =$ _____

9. $6^3 \div 6^{-4} =$ _____

$7^{-3} \div 7^4 =$ _____

10. $9^{-3} \times 9^4 =$ _____

$10^{-5} \times 10^{-2} =$ _____

11. $8^{-4} \div 8^{-2} =$ _____

$2^{-2} \times 2^{-12} =$ _____

12. $3^{-6} \times 3^{-3} =$ _____

$8^{-6} \div 8^4 =$ _____

13. $10^{-2} \div 10^3 =$ _____

$4^{-5} \times 4^{-2} =$ _____

14. $9^{-6} \div 9^{-3} =$ _____

$11^4 \div 11^{-2} =$ _____

15. $6^{-5} \div 6^3 =$ _____

$5^{-12} \times 5^{-4} =$ _____

16. $12^{-6} \div 12 =$ _____

$4^{-4} \times 4^{-3} =$ _____

Lesson 1.4 Scientific Notation

Scientific notation is most often used as a concise way of writing very large and very small numbers. It is written as a number between 1 and 10 multiplied by a power of 10. Any number can be expressed in scientific notation.

$$1,503 = 1.503 \times 10^3$$

+3

$$0.0376 = 3.76 \times 10^{-2}$$

-2

$$85 = 8.5 \times 10^1$$

+1

Translate numbers written in scientific notation into standard form by reading the exponent.

$$7.03 \times 10^5 = 703000$$

Move the decimal right 5 places.

$$5.4 \times 10^{-4} = 0.00054$$

Move the decimal left 4 places.

Write each number in scientific notation.

a

1. $0.013 =$ _____

b

$4105 =$ _____

c

$27.3 =$ _____

2. $810.4 =$ _____

$0.684 =$ _____

$0.017 =$ _____

3. $0.0006 =$ _____

$427.5 =$ _____

$36,054 =$ _____

4. $50,210 =$ _____

$0.0005 =$ _____

$256.21 =$ _____

5. $36.25 =$ _____

$0.892 =$ _____

$0.00065 =$ _____

6. $0.027 =$ _____

$1,416.3 =$ _____

$0.0049 =$ _____

Write each number in standard form.

7. $2.6 \times 10^{-3} =$ _____

$8.46 \times 10^5 =$ _____

$4.65 \times 10^{-1} =$ _____

8. $9.02 \times 10^4 =$ _____

$5.15 \times 10^{-2} =$ _____

$8.45 \times 10^3 =$ _____

9. $7.25 \times 10^{-4} =$ _____

$1.06 \times 10^3 =$ _____

$9.06 \times 10^{-5} =$ _____

10. $9.7 \times 10^{-3} =$ _____

$3.02 \times 10^4 =$ _____

$1.56 \times 10^4 =$ _____

Lesson 1.4 Scientific Notation

Write each number in scientific notation.

a

1. $32.5 =$ _____

2. $0.569 =$ _____

3. $0.079 =$ _____

4. $98.25 =$ _____

5. $7,831 =$ _____

6. $0.0004 =$ _____

7. $5,624 =$ _____

8. $0.0045 =$ _____

b

$6,708 =$ _____

$67,345 =$ _____

$0.51 =$ _____

$2,385 =$ _____

$418 =$ _____

$7,301.4 =$ _____

$23.65 =$ _____

$523 =$ _____

c

$387 =$ _____

$0.027 =$ _____

$6,791 =$ _____

$0.413 =$ _____

$75.183 =$ _____

$0.0018 =$ _____

$0.965 =$ _____

$0.355 =$ _____

Write each number in standard form.

9. $9.13 \times 10^5 =$ _____

$4.02 \times 10^{-3} =$ _____

$2.43 \times 10^4 =$ _____

10. $1.124 \times 10^{-1} =$ _____

$8.48 \times 10^3 =$ _____

$5.12 \times 10^{-2} =$ _____

11. $9.47 \times 10^3 =$ _____

$3.28 \times 10^{-4} =$ _____

$6.73 \times 10^{-3} =$ _____

12. $5.3 \times 10^{-5} =$ _____

$4.13 \times 10^4 =$ _____

$3.78 \times 10^4 =$ _____

13. $3.12 \times 10^3 =$ _____

$1.329 \times 10^5 =$ _____

$8.69 \times 10^2 =$ _____

14. $4.5 \times 10^{-4} =$ _____

$9.8 \times 10^{-6} =$ _____

$3.56 \times 10^5 =$ _____

15. $5.42 \times 10^{-2} =$ _____

$9.08 \times 10^{-8} =$ _____

$2.7 \times 10^3 =$ _____

16. $7.3 \times 10^2 =$ _____

$1.25 \times 10^4 =$ _____

$8.8 \times 10^{-8} =$ _____