

LESSON

Practice C**7-2****Powers of 10 and Scientific Notation**

Find the value of each power of 10.

1. 10^4 _____

2. 10^0 _____

3. 10^{-2} _____

4. 10^1 _____

5. 10^{-6} _____

6. 10^{-1} _____

Write each number as a power of 10.

7. $1000 =$ _____

8. $0.00001 =$ _____

9. $0.01 =$ _____

10. $10,000 =$ _____

11. $0.001 =$ _____

12. $10,000,000 =$ _____

Find the value of each expression.

13. $1 \times 10^4 =$ _____

14. $2 \times 10^4 =$ _____

15. $5.2 \times 10^{-4} =$ _____

16. $6.2 \times 10^7 =$ _____

17. $27.9 \times 10^5 =$ _____

18. $14.87 \times 10^0 =$ _____

19. $0.2 \times 10^{-6} =$ _____

20. $3.25 \times 10^2 =$ _____

21. $14.15 \times 10^4 =$ _____

22. $3.287 \times 10^{-6} =$ _____

State whether each number is written in scientific notation.

If not, explain why not.

23. 45×10^{-2} _____

24. 2.6×5^4 _____

25. 1.41×10^8 _____

Order the list of numbers from least to greatest.

26. $2.5 \times 10^{-1}; 2.4 \times 10^{-6}; 5 \times 10^3; 1.23 \times 10^{-1}; 2.5 \times 10^{-5}; 3.56 \times 10^3$

27. $4.5 \times 10^1; 2.9 \times 10^{-3}; 1.24 \times 10^0; 3.58 \times 10^{-6}; 5.5 \times 10^{-3}; 2.19 \times 10^{-6}$

28. The space telescope Hubble orbits the Earth every 97 minutes, and travels more than 1.50×10^8 miles every year. Write the distance traveled in standard notation. _____

29. Hubble has taken many photographs of Pluto. Pluto's mass is about 14,000,000,000,000,000,000 kg. Write Pluto's mass in scientific notation. _____

30. Write Pluto's mass in terms of grams.
(Hint: $1 \text{ kg} = 1,000 \text{ g}$) _____

LESSON Practice A
7-2 Powers of 10 and Scientific Notation

Find the value of each power of 10.

1. $10^{-2} = \underline{0.01}$ 2. $10^3 = \underline{1000}$
 3. $10^0 = \underline{1}$ 4. $10^{-5} = \underline{0.00001}$
 5. $10^{-1} = \underline{0.1}$ 6. $10^7 = \underline{10,000,000}$

Complete each statement to write each number as a power of 10.

7. 100,000 8. 0.0001 9. 0.001
 The decimal point is 5 places to the right of 1, so $100,000 = 10^{\underline{5}}$.
 The decimal point is 4 places to the left of 1, so $0.0001 = 10^{\underline{-4}}$.
 The decimal point is 3 places to the left of 1, so $0.001 = 10^{\underline{-3}}$.

Find the value of each expression.

10. $22.6 \times 10^4 = \underline{226,000}$ 11. $5.28 \times 10^{-3} = \underline{0.00528}$
 12. $476.283 \times 10^{-4} = \underline{0.0476283}$ 13. $0.482 \times 10^6 = \underline{482,000}$
 14. $0.29 \times 10^{-1} = \underline{0.029}$ 15. $6 \times 10^4 = \underline{60,000}$

Write each number in scientific notation.

16. 4500 $\underline{4.5 \times 10^3}$
 17. 6,560,000 $\underline{6.56 \times 10^6}$
 18. 0.00002 $\underline{2 \times 10^{-5}}$
 19. 0.00203 $\underline{2.03 \times 10^{-3}}$

Order each list of numbers from least to greatest.

20. 2.4×10^4 , 9.1×10^{-3} , 4.7×10^3 , 6.13×10^4 , 7.2×10^{-3} , 9.2×10^3
 7.2×10^{-3} , 9.1×10^{-3} , 4.7×10^3 , 9.2×10^3 , 2.4×10^4 , 6.13×10^4
 21. 4.5×10^8 , 1.1×10^{-3} , 4.1×10^{-2} , 5.6×10^{-2} , 9.2×10^8 , 4.2×10^8
 1.1×10^{-3} , 4.1×10^{-2} , 5.6×10^{-2} , 4.2×10^8 , 4.5×10^8 , 9.2×10^8

22. In 2003, the population of Virginia was about 7,390,000. Write the population in scientific notation. $\underline{7.39 \times 10^6}$
 23. The land area of Virginia is about 4×10^4 square miles. Write the area in standard form. $\underline{40,000 \text{ sq mi}}$
 24. In 2003, the population of the United States was about 2.9×10^8 . Write the population in standard form. $\underline{290,000,000}$
 25. The land area of the United States is about 5.98×10^6 square miles. Write the area in standard form. $\underline{5,980,000 \text{ sq mi}}$

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LESSON Practice B
7-2 Powers of 10 and Scientific Notation

Find the value of each power of 10.

1. $10^{-3} = \underline{0.001}$ 2. $10^5 = \underline{100,000}$ 3. $10^{-4} = \underline{0.0001}$
 4. $10^0 = \underline{1}$ 5. $10^7 = \underline{10,000,000}$ 6. $10^1 = \underline{10}$

Write each number as a power of 10.

7. 1,000,000 $\underline{10^6}$ 8. 0.001 $\underline{10^{-3}}$ 9. 0.000001 $\underline{10^{-6}}$
 10. 0.00001 $\underline{10^{-5}}$ 11. 0.1 $\underline{10^{-1}}$ 12. 0.00000001 $\underline{10^{-8}}$

Find the value of each expression.

13. $5.02 \times 10^3 = \underline{5020}$ 14. $603 \times 10^{-4} = \underline{0.0603}$
 15. $52.8 \times 10^6 = \underline{52,800,000}$ 16. $5.41 \times 10^{-3} = \underline{0.00541}$
 17. $0.03 \times 10^{-2} = \underline{0.0003}$ 18. $22.81 \times 10^{-6} = \underline{0.00002281}$

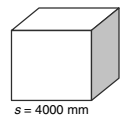
Write each number in scientific notation.

19. 4500 $\underline{4.5 \times 10^3}$ 20. 6,560,000 $\underline{6.56 \times 10^6}$
 21. 0.00002 $\underline{2 \times 10^{-5}}$ 22. 0.00203 $\underline{2.03 \times 10^{-3}}$

Order the list of numbers from least to greatest.

23. 3×10^2 ; 4.54×10^{-3} ; 6.75×10^2 ; 8.2×10^{-4} ; 9×10^{-1} ; 6.18×10^{-4}
 6.18×10^{-4} ; 8.2×10^{-4} ; 4.54×10^{-3} ; 9×10^{-1} ; 3×10^2 ; 6.75×10^2
 24. 5.4×10^{-3} ; 6.2×10^{-1} ; 7.25×10^3 ; 6.87×10^3 ; 2.24×10^{-1} ; 6.6×10^{-3}
 5.4×10^{-3} ; 6.6×10^{-3} ; 2.24×10^{-1} ; 6.2×10^{-1} ; 6.87×10^3 ; 7.25×10^3

25. In 1970, the number of televisions sold in the United States was about 1.2×10^7 . Write this number in standard form. $\underline{12,000,000}$
 26. In 1950, about 3,880,000 households in the United States had televisions. Write this number in scientific notation. $\underline{3.88 \times 10^6}$
 27. Find the volume of the cube shown at right. Write the answer in both standard form and in scientific notation.
 $64,000,000,000 \text{ mm}^3$
 $6.4 \times 10^{10} \text{ mm}^3$



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LESSON Practice C
7-2 Powers of 10 and Scientific Notation

Find the value of each power of 10.

1. $10^4 = \underline{10,000}$ 2. $10^0 = \underline{1}$ 3. $10^{-2} = \underline{0.01}$
 4. $10^1 = \underline{10}$ 5. $10^{-6} = \underline{0.000001}$ 6. $10^{-1} = \underline{0.1}$

Write each number as a power of 10.

7. 1000 = $\underline{10^3}$ 8. 0.00001 = $\underline{10^{-5}}$ 9. 0.01 = $\underline{10^{-2}}$
 10. 10,000 = $\underline{10^4}$ 11. 0.001 = $\underline{10^{-3}}$ 12. 10,000,000 = $\underline{10^7}$

Find the value of each expression.

13. $1 \times 10^4 = \underline{10,000}$ 14. $2 \times 10^4 = \underline{20,000}$
 15. $5.2 \times 10^{-4} = \underline{0.00052}$ 16. $6.2 \times 10^7 = \underline{62,000,000}$
 17. $27.9 \times 10^5 = \underline{2,790,000}$ 18. $14.87 \times 10^0 = \underline{14.87}$
 19. $0.2 \times 10^{-6} = \underline{0.0000002}$ 20. $3.25 \times 10^2 = \underline{325}$
 21. $14.15 \times 10^4 = \underline{141,500}$ 22. $3.287 \times 10^{-6} = \underline{0.000003287}$

State whether each number is written in scientific notation. If not, explain why not.

23. 45×10^{-2} no; the first number is not between 1 and 10.
 24. 2.6×5^4 no; the second number is not a power of 10.
 25. 1.41×10^8 yes

Order the list of numbers from least to greatest.

26. 2.5×10^{-1} ; 2.4×10^{-6} ; 5×10^3 ; 1.23×10^{-1} ; 2.5×10^{-5} ; 3.56×10^3
 2.5×10^{-6} ; 2.5×10^{-5} ; 1.23×10^{-1} ; 2.5×10^{-1} ; 3.56×10^3 ; 5×10^3
 27. 4.5×10^1 ; 2.9×10^{-3} ; 1.24×10^0 ; 3.58×10^{-6} ; 5.5×10^{-3} ; 2.19×10^{-6}
 2.19×10^{-6} ; 3.58×10^{-6} ; 2.9×10^{-3} ; 5.5×10^{-3} ; 1.24×10^0 ; 4.5×10^1

28. The space telescope Hubble orbits the Earth every 97 minutes, and travels more than 1.50×10^8 miles every year. Write the distance traveled in standard notation. $\underline{150,000,000 \text{ mi}}$
 29. Hubble has taken many photographs of Pluto. Pluto's mass is about 14,000,000,000,000,000,000,000 kg. Write Pluto's mass in scientific notation. $\underline{1.4 \times 10^{22} \text{ kg}}$
 30. Write Pluto's mass in terms of grams. (Hint: 1 kg = 1,000 g) $\underline{1.4 \times 10^{25} \text{ g}}$

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LESSON Review for Mastery
7-2 Powers of 10 and Scientific Notation

Powers of 10 are used to write large numbers in a simple way.

The exponent will tell you how many places to move the decimal when finding the value of a power of 10.

Find the value of 10^5 .

Step 1: Start with the number 1.

1.0

Step 2: The exponent is positive 5. Move the decimal 5 spaces to the right.

$1.00000 = 100,000$

Write 100,000,000 as a power of 10.

$100,000,000$

The decimal point is 8 places to the right of the 1. The exponent is 8.

$100,000,000 = 10^8$

Numbers greater than 1 will have a positive exponent.

Find the value of 10^{-4} .

Step 1: Start with the number 1.

1.0

Step 2: The exponent is negative 4. Move the decimal 4 spaces to the left.

$0.0001 = 0.0001$

Write 0.00001 as a power of 10.

0.00001

The decimal point is 5 places to the left of the one. The exponent is -5.

$0.00001 = 10^{-5}$

Numbers less than 1 will have a negative exponent.

First determine whether the decimal point will move to the right or to the left. Then find the value of each power of 10.

1. 10^6 right $\underline{1,000,000}$
 2. 10^{-2} left $\underline{0.01}$
 3. 10^4 right $\underline{10,000}$

First determine whether the exponent will be positive or negative when each number is written as a power of 10. Then write each number as a power of 10.

4. 1000 positive $\underline{10^3}$
 5. 0.0001 negative $\underline{10^{-4}}$
 6. 10,000,000 positive $\underline{10^7}$

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