

# 4-1 | Homework

Digital Resources



1. Which of the following is a pattern in the table?

Number	Powers of 10
1,830	$1.83 \times 10^3$
183.0	$1.83 \times 10^2$
18.3	$1.83 \times 10^1$
1.83	$1.83 \times 10^0$
0.183	$1.83 \times 10^{-1}$
0.0183	$1.83 \times 10^{-2}$
0.00183	$1.83 \times 10^{-3}$

- A. As the exponent of 10 increases, the number decreases.  
 B. As the exponent of 10 decreases, the number decreases.  
 C. The exponents that are less than 0 cause the number to become negative.  
 D. The exponents that are greater than 0 cause the number to decrease.
2. Which list shows the numbers in order from least to greatest?  
 A.  $3.18 \times 10^{-3}$ ,  $3.18 \times 10^5$ ,  $3.18 \times 10^6$   
 B.  $3.18 \times 10^6$ ,  $3.18 \times 10^5$ ,  $3.18 \times 10^{-3}$   
 C.  $3.18 \times 10^{-3}$ ,  $3.18 \times 10^6$ ,  $3.18 \times 10^5$   
 D.  $3.18 \times 10^5$ ,  $3.18 \times 10^{-3}$ ,  $3.18 \times 10^6$
3. Which of the following numbers is written in scientific notation?  
 A.  $20 \times 10^7$       B. 20  
 C. 8.66      D.  $8.66 \times 10^7$
4. Is the number  $4.74 \times 14^2$  in scientific notation?  
 A. No, it is not in scientific notation. The first factor is not less than 10.  
 B. No, it is not in scientific notation. The first factor is not greater than or equal to 1.  
 C. No, it is not in scientific notation. The second factor is not a power of 10.  
 D. The number is in scientific notation.

5. a. Which of these calculations produces the calculator result  $8.1E+12$ ?  
 A.  $81 \times 100,000,000,000$   
 B.  $81 \div 100,000,000,000$   
 C.  $81 \div 10,000,000,000,000$   
 D.  $81 \times 10,000,000,000,000$
- b. Write the calculator result in scientific notation.
6. a. **Writing** After doing a calculation, your calculator display shows  $4.5E-11$ . Express this result in scientific notation.  
 b. Give three reasons why your calculator shows this result instead of 0.000000000045.
7. **Reasoning** Is  $23 \times 10^{-6}$  in scientific notation?  
 A. No, it is not in scientific notation. The second factor is not a power of 10.  
 B. No, it is not in scientific notation. The number is not written as a product of 2 factors.  
 C. No, it is not in scientific notation. The first factor is not less than 10.  
 D. The number is in scientific notation.
8. **Error Analysis** Fred's math teacher asks, "Which of the following numbers are written in scientific notation?" Fred says, " $4.75 \times 10^8$  is written in scientific notation."  
 a. What is the correct answer? Select all that apply.  
 A.  $8.87 \times 10^8$       B.  $4.75 \times 10^8$   
 C. 17      D. 4.75  
 b. What error did Fred make?  
 A. The number 17 is also written in scientific notation.  
 B. The number  $8.87 \times 10^8$  is also written in scientific notation.  
 C. The number  $4.75 \times 10^8$  is not written in scientific notation.  
 D. The number 4.75 is also written in scientific notation.

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## 4-2 | Homework

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1. Express the number 80,000 in scientific notation.
2. Express the number 60,000 in scientific notation.
3. **Think About the Process** You want to express 437,000 in scientific notation.
  - a. What is the first step?
    - A. Move the decimal point 5 places to the left to get 4.37.
    - B. Move the decimal point 4 places to the left to get 4.37.
    - C. Move the decimal point 4 places to the left to get 43.7.
    - D. Move the decimal point 5 places to the left to get 43.7.
  - b. What is the result?
4. Express the number  $8.5 \times 10^5$  in standard form.
5. The diameter of a certain star is about  $9.3 \times 10^6$  km. Express this diameter in standard form.
6. Which number is greater?
  - A.  $6 \times 10^6$
  - B.  $7 \times 10^9$
7. A rectangle has length  $8 \times 10^4$  mm and width  $4 \times 10^4$  mm. The rectangle's length is how many times its width?
8. **a. Writing** Express the number  $5.2 \times 10^6$  in standard form.
  - b. Describe two advantages that scientific notation has over standard form. Describe two advantages of standard form. Give examples for each.
9. Two space probes, Pilgrim 4 and Titan 2, were launched several decades ago. Today, they are about  $6.93 \times 10^9$  km and  $2.31 \times 10^{11}$  m from Earth, respectively. Which probe is farther from Earth today?
10. **a. Reasoning** Which number is less,  $6.9 \times 10^6$  or 630,000?
  - b. When you compare two numbers in scientific notation, which do you compare first, the first factors or the exponents? Explain.
11. **Error Analysis** Owen incorrectly claims that because  $20,000 = 20 \times 1,000$ , he can express 20,000 in scientific notation as  $20 \times 10^3$ .
  - a. What was Owen's error?
    - A. The product he found is correct, but  $20 \times 10^3$  is not in scientific notation since 20 is not less than 10.
    - B. The product he found is correct, but  $20 \times 10^3$  is not in scientific notation since 20 is not less than 1.
    - C. He found the power of 10 incorrectly since  $1,000 \neq 10^3$ .
    - D. He found the product incorrectly since  $20,000 \neq 20 \times 1,000$ .
  - b. Express 20,000 in scientific notation correctly.
12. **Population** An historian predicts that by 2050, about  $1.56 \times 10^7$  people will live in a certain country. Express this prediction in standard form.
13. **a.** Express the number 586,400,000 in scientific notation.
  - b. Describe a situation in which this number might arise. Explain why it would be easier to use scientific notation in that situation.
14. **a. Multiple Representations** Express the mass 6,200,000 kilograms using scientific notation in two ways, first with kilograms and then with grams.
  - b. List some other scientific-notation forms for this mass using other metric prefixes.



1. Express the number 0.0073 in scientific notation.
2. Express 0.5 in scientific notation by counting decimal places.
3. Write  $3.91 \times 10^{-2}$  in standard form.
4. The length of a bacterial cell is  $6.2 \times 10^{-6}$  m. Express the length of the cell in standard form.
5. Which number is greater,  $7 \times 10^{-9}$  or  $6 \times 10^{-4}$ ?
6. Write 0.0000734 in scientific notation by counting decimal places.
7. A plant cell has length  $5.8 \times 10^{-6}$  m and width  $2.9 \times 10^{-6}$  m. What is the ratio of the plant cell's length to its width?
8. **a. Writing** Express 0.00000298 in scientific notation.  
**b.** Explain how negative powers of 10 make small numbers easier to write and compare.
9. **Think About the Process**  
**a.** What should you do first to write  $5.871 \times 10^{-7}$  in standard form?  
**A.** Move the decimal point 7 places to the right.  
**B.** Move the decimal point 6 places to the right.  
**C.** Move the decimal point 6 places to the left.  
**D.** Move the decimal point 7 places to the left.  
**b.** Write  $5.871 \times 10^{-7}$  in standard form.
10. **Reasoning** A nanometer is one-billionth of a meter. A centimeter is one-hundredth of a meter, and a kilometer is 1,000 meters. An X-ray can have a wavelength of 0.000000036 meter.  
**a.** Express this wavelength in scientific notation.  
**b.** Which unit is most appropriate for measuring the wavelength of an X-ray?  
**A.** meter  
**B.** nanometer  
**C.** kilometer  
**D.** centimeter
11. **Error Analysis** Your teacher asks you to write  $3.92 \times 10^{-6}$  in standard form. Your classmate gives an incorrect answer of 0.000000392.  
**a.** Write  $3.92 \times 10^{-6}$  in standard form.  
**b.** What was your classmate's likely error?  
**A.** Your classmate moved the decimal point 1 extra place to the left.  
**B.** Your classmate moved the decimal point 1 extra place to the right.  
**C.** Your classmate moved the decimal point 2 extra places to the left.  
**D.** Your classmate moved the decimal point 2 extra places to the right.
12. **Hair Growth** Human hair grows at a rate of  $2.33 \times 10^{-6}$  m per minute or  $1.398 \times 10^{-4}$  m per hour.  
**a.** Express each rate in standard form.  
**b.** Explain how you would find the rate at which hair grows per day.
13. **Mental Math** Express this number in scientific notation.  
0.000000004
14. **Multiple Representations** The numbers below represent 0.002 as a product of two factors. Which product is written in scientific notation?  
**A.**  $2 \times 10^{-3}$   
**B.**  $20 \times 10^{-4}$   
**C.**  $0.2 \times 10^{-2}$   
**D.**  $200 \times 10^{-5}$
15. **Mental Math** Write  $8 \times 10^{-3}$  in standard form.