Name _____ Class _____ Date _____

Practice 4-1

Exploring Scientific Notation

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

❍ 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.

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

2. Which list shows the numbers in order from least to greatest?

❍ A. 3.18×10^{-3}, 3.18×10^5, 3.18×10^6

❍ B. 3.18×10^6, 3.18×10^5, 3.18×10^{-3}

❍ C. 3.18×10^{-3}, 3.18×10^6, 3.18×10^5

❍ D. 3.18×10^5, 3.18×10^{-3}, 3.18×10^6

3. Which of the following numbers is written in scientific notation?

❍ A. 20×10^7

❍ B. 20

❍ C. 8.66

❍ D. 8.66×10^7

4. Is the number 4.74×14^2 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. Suppose your calculator display shows 5.3E – 9. Express this result in scientific notation.

6. 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.

7. **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.

8. **Reasoning** Is 23×10^{-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.

9. **Error Analysis** Fred's math teacher asks, "Which of the following numbers are written in scientific notation?" Fred says, "4.75×10^8 is written in scientific notation."

   a) What is the correct answer? Check all that apply.

   ❑ A. 8.87×10^8

   ❑ B. 4.75×10^8

   ❑ C. 17

   ❑ D. 4.75

   b) What error did Fred make?

   ❍ A. The number 17 is also written in scientific notation.

   ❍ B. The number 8.87×10^8 is also written in scientific notation.

   ❍ C. The number 4.75×10^8 is not written in scientific notation.

   ❍ D. The number 4.75 is also written in scientific notation.

10. **Astronomy** In a science fiction book, the distances from four planets to another planet are given in light years. Which list shows the distances in order from least to greatest?

    ❍ A. 6.35×10^6, 6.35×10^{-2}, 6.35×10^4, 6.35×10^7

    ❍ B. 6.35×10^{-2}, 6.35×10^7, 6.35×10^4, 6.35×10^6

    ❍ C. 6.35×10^7, 6.35×10^6, 6.35×10^4, 6.35×10^{-2}

    ❍ D. 6.35×10^{-2}, 6.35×10^4, 6.35×10^6, 6.35×10^7

11. Pierre evaluates an expression on his calculator, and the calculator display shows 5.7E –11. Express this result in scientific notation.

12. a) Which number is not written in scientific notation?

- ❍ A. 9.91×10^6
- ❍ B. 1.51×18^3
- ❍ C. 3.27×10^6
- ❍ D. 1.51×10^3
- ❍ E. 9.91×10^3
- ❍ F. 3.27×10^3

b) Why is this number not in scientific notation?

- ❍ A. The first factor is not less than 10.
- ❍ B. The second factor is not a power of 10.
- ❍ C. The first factor is not greater than or equal to 1.
- ❍ D. The number is not written as a product of 2 factors.

c) Show two other ways that numbers can look like they are written in scientific notation, but really are not. Ask a classmate or family member why the numbers are not in scientific notation.

13. Which list shows the numbers in order from least to greatest?

- ❍ A. 9.07×10^{-7}, 7.74×10^{-7}, 7.03×10^{-8}, 3.35×10^{-4}, 1.99×10^{-9}
- ❍ B. 3.35×10^{-4}, 9.07×10^{-7}, 7.74×10^{-7}, 7.03×10^{-8}, 1.99×10^{-9}
- ❍ C. 1.99×10^{-9}, 3.35×10^{-4}, 7.03×10^{-8}, 7.74×10^{-7}, 9.07×10^{-7}
- ❍ D. 1.99×10^{-9}, 7.03×10^{-8}, 7.74×10^{-7}, 9.07×10^{-7}, 3.35×10^{-4}

14. a) **Challenge** Which list shows the numbers in order from least to greatest?

- ❍ A. 4.51×10^{-8}, 5.66×10^{-8}, 6.31×10^{-7}, 6.53×10^{-7}, 9.45×10^{-5}
- ❍ B. 9.45×10^{-5}, 6.53×10^{-7}, 6.31×10^{-7}, 5.66×10^{-8}, 4.51×10^{-8}
- ❍ C. 4.51×10^{-8}, 5.66×10^{-8}, 6.31×10^{-7}, 6.53×10^{-7}, 9.45×10^{-5}
- ❍ D. 9.45×10^{-5}, 6.53×10^{-7}, 6.31×10^{-7}, 5.66×10^{-8}, 4.51×10^{-8}

b) Explain how the order would change if all the exponents were zero. Then change the exponents to their opposites and list the numbers in order from least to greatest.

15. a) **Challenge** Which number is expressed in scientific notation?

- ❍ A. 3.42×18^9
- ❍ B. 18×18^9
- ❍ C. 0.99×18^9
- ❍ D. 0.99×10^9
- ❍ E. 3.42×10^9
- ❍ F. 18×10^9

b) When a number is written in scientific notation, could zero ever be in the ones place of the first factor? Which digits, if any, would never be in the ones place?

*Practice 4-1: **Exploring Scientific Notation***

1. B
2. A
3. D
4. C
5. 5.3×10^{-9}
6. a) A
b) 8.1×10^{12}
7. a) 4.5×10^{-11}
b) Answers will vary
8. C
9. a) A, B
b) B
10. D
11. 5.7×10^{-11}
12. a) B
b) B
c) Answers will vary
13. D
14. a) A
b) Answers will vary
15. a) E
b) Answers will vary