

## WRITING IN SCIENTIFIC NOTATION

### ● Steps 1-2

- Move decimal left or right so that only one number is in front of decimal
- Drop any zeros that aren't significant, but make sure you include ALL sig figs in your coefficient, including any significant zeros

● *Example:  $93,000,000 = 9.3$*

● *Example:  $0.00000450 = 4.50$*

### ● Step 2

- Count how many places you moved decimal
- Make that your power of ten.
  - If you moved the decimal to the left (the number was really big), then the exponent is positive.
    - *Example:  $93,000,000 = 9.3 \times 10^7$*  (The power of ten is 7 because the decimal moved 7 places to the left)
  - If you moved the decimal to the right (the number was really small), then the exponent is negative.
    - *Example:  $0.00000450 = 4.50 \times 10^{-6}$*  (the power of ten is -6 because you moved the decimal 6 places to the right)

### Practice Problems

1. 1000 \_\_\_\_\_
2. 150,000 \_\_\_\_\_
3. 243 \_\_\_\_\_
4. 9.3 \_\_\_\_\_
5. 435, 000, 000, 000 \_\_\_\_\_
6. 0.0035 \_\_\_\_\_
7. 0.12567 \_\_\_\_\_
8. 0.0000000000100 \_\_\_\_\_
9. 0.000000000000467 \_\_\_\_\_

- 10. 0.000200 \_\_\_\_\_
- 11. 186,000 \_\_\_\_\_
- 12. 9,000,000,000,000 \_\_\_\_\_
- 13. 105 \_\_\_\_\_
- 14. 77,000 \_\_\_\_\_
- 15. 502,000 \_\_\_\_\_

**ADDING OR SUBTRACTING IN SCIENTIFIC NOTATION**

When adding or subtracting numbers in scientific notation, the exponents **MUST** be the same.

● Steps 1-2

● Make sure the numbers you are adding or subtracting in scientific notation have the same exponent.

● If they don't have the same exponent, move the decimal in the coefficient of your smaller number to the left to match the difference between the exponents.

● Then the exponents will match. In the example below,  $3.0 \times 10^4$  is the smaller number, so we move the decimal in the 3.0 once to the left to change the exponent to 5.

● *Example:  $8.6 \times 10^5 + 3.0 \times 10^4 = 8.6 \times 10^5 + 0.30 \times 10^5$*

● *Remember this rule: LPRN (Left = negative; Right = positive). When you move the decimal to the left, the exponent increases. When you move the decimal to the right, the exponent decreases.*

● Once the exponents are the same, you can simply add or subtract the coefficients and the exponent will remain the same.

Practice Problems

- 16.  $(8.34 \times 10^{-5}) + (1.2 \times 10^{-6}) =$  \_\_\_\_\_
- 17.  $(4.93 \times 10^{-1}) - (1.2 \times 10^{-2}) =$  \_\_\_\_\_
- 18.  $(1.66 \times 10^{-5}) + (6.4 \times 10^{-6}) =$  \_\_\_\_\_
- 19.  $(6.34 \times 10^{15}) + (1.2 \times 10^{16}) =$  \_\_\_\_\_
- 20.  $(6.34 \times 10^{15}) - (1.2 \times 10^1) =$  \_\_\_\_\_
- 21.  $(8.34 \times 10^5) + (1.22 \times 10^5) =$  \_\_\_\_\_
- 22.  $(4.88 \times 10^3) - (1.22 \times 10^3) =$  \_\_\_\_\_
- 23.  $(5.6 \times 10^{-4}) + (1.2 \times 10^{-4}) =$  \_\_\_\_\_

24.  $(6.38 \times 10^5) + (1.2 \times 10^4) =$  \_\_\_\_\_

25.  $(8.34 \times 10^5) - (1.2 \times 10^4) =$  \_\_\_\_\_

### MULTIPLYING OR DIVIDING IN SCIENTIFIC NOTATION

● When multiplying two numbers in scientific notation, do the following:

● Multiply the coefficient together (all significant figure rules apply)

● ADD the exponents

● When dividing two numbers in scientific notation, do the following:

● Divide the coefficients (all significant figure rules apply)

● SUBTRACT the exponents

### PRACTICE PROBLEMS

26.  $(2.0 \times 10^7)(2.0 \times 10^7) =$  \_\_\_\_\_

27.  $(4.0 \times 10^{-3})(1.2 \times 10^{-2}) =$  \_\_\_\_\_

28.  $(4 \times 10^{-11})(5 \times 10^2) =$  \_\_\_\_\_

29.  $(1.53 \times 10^3)(4.200 \times 10^5) =$  \_\_\_\_\_

30.  $(2 \times 10^{-13})(3.00 \times 10^{-22}) =$  \_\_\_\_\_

31.  $4.0 \times 10^5 \div 2.0 \times 10^5 =$  \_\_\_\_\_

32.  $6.2 \times 10^{15} \div 2.0 \times 10^5 =$  \_\_\_\_\_

33.  $8.6 \times 10^{-5} \div 3.1 \times 10^3 =$  \_\_\_\_\_

34.  $8.6 \times 10^{-5} \div 3.1 \times 10^{-11} =$  \_\_\_\_\_