

SCIENTIFIC NOTATION

Keys

Regular Notation (RN) - The standard way that we write our numbers.

Ex: Two Hundred and Eight Million is written - 280,000,000.

Scientific Notation (SN) - A shorthand way of writing really large or really small numbers. In SN a number is written as the *product* of two factors.

Ex: 280,000,000 can be written in scientific notation as 2.8×10^8 .

First Factor
A number that is between 1 and 10 it may or may not be a decimal.

$$2.8 \times 10^8$$

Second Factor
Is always a power of 10. The power of the exponent tells you how many places to move the decimal point. The sign of the exponent tells you which direction to move it.

Regular Notation → Scientific Notation

Regular Notation	How to Change	Scientific Notation
420,000.	Move the decimal after the 4 and before the 2 That is 5 places to the left Multiply 4.2 by 10 to the 5 th power	4.2×10^5
735,000,000.	Move the decimal after the 7 and before the 3 That is 8 places to the left Multiply 7.35 by 10 to the 8 th power	7.35×10^8
.00897	Move the decimal after the 8 and before the 9 That is 3 places to the right Multiply 8.97 by 10 to the -3 rd power	8.97×10^{-3}
.0000014	Move the decimal after the 1 and before the 4 That is 6 places to the right Multiply 1.4 by 10 to the -6 th power	1.4×10^{-6}

If Decimal is moved left
Exponent will be positive

If Decimal is moved to Right
Exponent will be negative

Scientific Notation → Regular Notation

Scientific Notation	How to Change	Regular Notation
7.5×10^5	Exponent is positive 5. Move the decimal 5 places to the right	750,000.
3.8×10^4	Exponent is positive 4. Move the decimal 4 places to the right	38,000.
4.2×10^{-3}	Exponent is Negative 3. Move the decimal 3 places to the left.	.0042
7.51×10^{-5}	Exponent is Negative 5. Move the decimal 5 places to the left.	.0000751

If exponent is Negative
Move decimal to the Left
Add zeros where needed.

If exponent is Positive
Move decimal to the Right
Add zeros where needed.

PRACTICE:

Change from Regular Notation to Scientific Notation:	Change from Scientific Notation to Regular Notation:
1.) 45,000	1.) 9.46×10^{-6}
2.) 9,000,000	2.) 2.5×10^3
3.) 7,450	3.) 1.6×10^{-2}
4.) 0.000378	4.) 4×10^5
5.) .05	5.) 7.25×10^4
6.) 670,400	6.) 3.2456×10^{-8}
7.) 7,070,000,000	7.) 6×10^{-3}
8.) 0.00000089	8.) 9.7×10^7
9.) 18900097	9.) 5.06×10^{-4}
10.) 570,000,000	10.) 8×10^2

Multiplying Numbers in Scientific Notation

Day 3

Reminder: Exponents do not need to be the same when multiplying with scientific notation. You can use the commutative property when multiplying.

1. Multiply the numbers between 1 and 10 together.
2. Multiply the powers of 10 by adding the exponents.
3. Make sure to put the product in scientific notation.

Example 1:

$$(3 \times 10^4)(7.2 \times 10^6) = (3 \times 7.2)(10^4 \times 10^6) = 21.6 \times 10^{10} = 2.16 \times 10^{11}$$

Example 2:

$$(1.7 \times 10^6)(3.2 \times 10^{-2}) = (1.7 \times 3.2)(10^6 \times 10^{-2}) = 5.44 \times 10^8$$

Solve the problems below. Be sure to show your work.

1. $(2.4 \times 10^3)(1.5 \times 10^5)$

$$2.4 \cdot 1.5 (10^3 \cdot 10^5)$$

$$3.6 \times 10^8$$

2. $(5.2 \times 10^{-6})(1.1 \times 10^3)$

$$(5.2)(1.1) \cdot (10^{-6} \cdot 10^{-3})$$

$$5.72 \times 10^{-9}$$

3. $(6.8 \times 10^4)(4.2 \times 10^4)$

$$(6.8)(4.2) \cdot (10^4 \cdot 10^4)$$

$$28.56 \cdot 10^8$$

$$= 2.856 \times 10^9$$

5. $(7.42 \times 10^{12})(1.4 \times 10^{-3})$

$$(7.42)(1.4) \cdot (10^{12} \cdot 10^{-3})$$

$$10.388 \times 10^9$$

$$1.0388 \times 10^{10}$$

6. $(2.13 \times 10^{-6})(9.01 \times 10^{-7})$

$$(2.13)(9.01) \cdot (10^{-6} \cdot 10^{-7})$$

$$19.19 \times 10^{-13}$$

$$1.919 \times 10^{-12}$$

Dividing Numbers in Scientific Notation

Day 3

Reminder: Exponents do not need to be the same when dividing with scientific notation.

1. Divide the first two numbers.
2. Subtract the second exponent from the first exponent.
3. Be sure the quotient is in scientific notation.

Example:

$$(9.6 \times 10^4) \div (6.4 \times 10^2) = (9.6 \div 6.4) \times (10^4 \div 10^2) = 1.5 \times 10^2$$

Solve the following problems. Be sure to write the answer in scientific notation and show your work.

1. $(4.25 \times 10^6) \div (1.7 \times 10^3)$

$$4.25 \div 1.7 \times 10^{6-3}$$

$$2.5 \times 10^3$$

2. $(3.6 \times 10^7) \div (1.2 \times 10^3)$

$$3.6 \div 1.2 \times 10^{7-3}$$

$$3 \times 10^4$$

3. $(8.08 \times 10^{-10}) \div (4.0 \times 10^{-3})$

$$8.08 \div 4 \times 10^{-10-(-3)}$$

$$2.02 \times 10^{-7}$$

4. $(5.25 \times 10^8) \div (3.5 \times 10^3)$

$$5.25 \div 3.5 \times 10^{8-3}$$

$$1.5 \times 10^5$$

5. $(4.5 \times 10^8) \div (9 \times 10^2)$

$$4.5 \div 9$$

$$0.5 \times 10^{8-2}$$

$$.5 \times 10^6$$

$$5 \times 10^5$$

6. $(5.76 \times 10^{-7}) \div (3 \times 10^{-9})$

$$5.76 \div 3 \times 10^{-7-(-9)}$$

$$1.92 \times 10^2$$