Input Calculations in Scientific Notation MathPrint View

Objectives

- Recognize how the GC abbreviates scientific notation
- Given a calculation in standard notation, write it in scientific notation
- Input a calculation using the GC's **E** notation, by pressing the 2nd function **EE**
- Interpret **E** notation to write answer in standard notation

Recognize how the GC abbreviates scientific notation

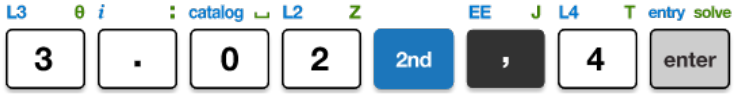
Scientific notation can be used to write any number as $a \times 10^b$, where
$1 \le a < 10$ (This means that a has one nonzero digit to the left of the decimal point) and
b is an integer $\{\ldots -3, -2, -1, 0, 1, 2, 3, \ldots\}$.

Correct scientific notation $a \times 10^b$ looks like a **E** b on the GC screen.
The GC changes $\times 10$ to **E** and moves the exponent b down.
IMPORTANT: a **E** b is NOT correct mathematical notation, so do not write **E** as a final answer on paper.

Example 1: Input 3.02×10^4 into GC.

CAUTION: We do NOT press 

!

Press these buttons 

to see this screen 

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3.02×10^4 is equal to 30200, and can appear on the GC as 30200 or 3.02E4.

Given a calculation in standard notation, write it in scientific notation

To write a number in scientific notation, determine a and b.
To find a, start on the left side of the number and find the first non-zero digit. Write it and all digits that follow (including zeros in between) until the last non-zero digit.
To find b when it's *positive*, find how many times you *multiply* a by 10 to get the original number.
To find b when it's *negative*, find how many times you *divide* a by 10.
Some people find b by counting the number of places the decimal point is moved.

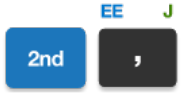
Example 2: Write this calculation in scientific notation: $0.000000008 \times 60,000,000$

Moving the decimal point 9 places is equivalent to dividing 8 by 10^9 to get $\left(8 \times 10^{-9}\right)$.

Moving the decimal point 7 places is equivalent to multiplying 6 by 10^7.
Answer: $\left(8 \times 10^{-9}\right)\left(6 \times 10^7\right)$

Input a calculation using the GC's E notation by pressing the 2nd function EE

The 2nd function **EE** means 'multiply by a power of 10'. It appears as only **E** on the screen.

To input a number using **E** notation, press: 

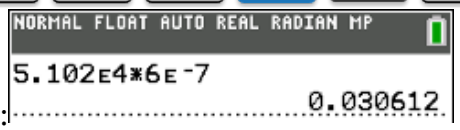
between a and b.

CAUTION: Do not type the multiplication symbol or the 10. Also, do not press the caret or exponent.
CAUTION: The **EE** or **E** is NOT the irrational number $e \approx 2.718$.

Example 3: Calculate $(5.201\times10^{4})(6\times10^{-7})$ by typing **E** notation.

Press these buttons

to see this screen:



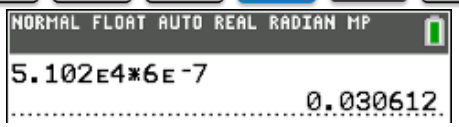
This answer was automatically displayed in standard notation. But that doesn't always happen!

Interpret E notation to write answer in standard notation

Example 4: Calculate $(5.201\times10^{3})(6\times10^{-8})$ by typing **E** notation. Write answer in standard notation.

Press these buttons

to see this screen



Notice that the result is still in scientific notation, and means 3.1206×10^{-4}

Recall that a negative exponent in the numerator means a positive one in the denominator: $3.1206\times\frac{1}{10^{4}}$

Dividing by 10 four times will move the decimal point four places left, requiring three zeros.
Answer: 0.00031206

Try It!

Write in standard notation by typing **E** notation into your calculator.

1) 3×10^{5} 2) 2.116×10^{-3} 3) 3.24×10^{0}

Calculate by typing **E** notation. Write answer in scientific notation.

4) $(3\times10^{23})(7\times10^{30})$ 5) $(5\times10^{-11})(2\times10^{-13})$ 6) $\frac{0.00000000000008}{40{,}000{,}000{,}000{,}000}$ 7) $\frac{6{,}000{,}000{,}000{,}000}{0.0000002}$

Calculate by writing in scientific notation, then typing **E** notation. Write answer in standard notation.

8) $\frac{0.000000008}{0.002}$ 9) $\frac{7{,}000{,}000{,}000}{5{,}000{,}000}$

Answers

1) $300{,}000$
2) 0.002116
3) 3.24
4) 2.1×10^{54}
5) 1×10^{-23}
6) $\frac{(8\times10^{-14})}{(4\times10^{13})}=2\times10^{-27}$
7) $\frac{(6\times10^{12})}{(2\times10^{-12})}=3\times10^{24}$
8) $\frac{(8\times10^{-9})}{(2\times10^{-3})}=4\times10^{-6}=0.000004$
9) $\frac{7\times10^{9}}{5\times10^{7}}=1.4\times10^{2}=140$