Algebra 1 7.4

*8th grade standard

Express numbers in scientific notation*

Find products and quotients of numbers in scientific notation

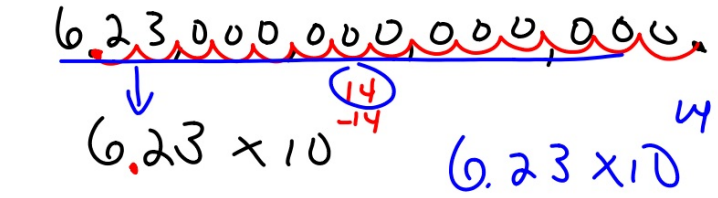
scientific notation

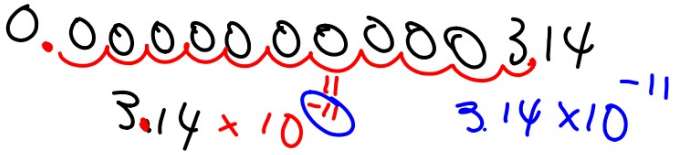
exponent

standard form

activity: triangle puzzles

whiteboards





KeyConcept Standard Form to Scientific Notation

Step 1 Move the decimal point until it is to the right of the first nonzero digit. The result is a real number a.

Step 2 Note the number of places n and the direction that you moved the decimal point.

Step 3 If the decimal point is moved left, write the number as $a \times 10^{n}$.
If the decimal point is moved right, write the number as $a \times 10^{-n}$.

Step 4 Remove the unnecessary zeros.

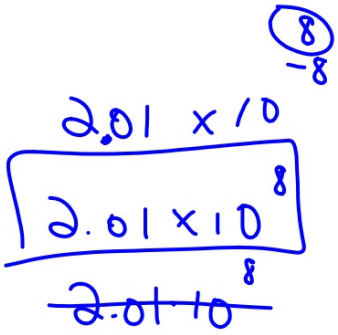
Make it a 1-digit number by moving decimal point
(between 1 and 9)
How for did you move it?
(Remember, every place value is x10)

Did it get bigger or smaller?
(we have to keep things equal)

Example 1 Standard Form to Scientific Notation

Express each number in scientific notation.

a. 201,000,000



b. 0.000051

5.1×10^{-5}

5.1×10^{-5}

GuidedPractice

1A. 68,700,000,000

8

6.87×10^{10}

6.87×10^{-10}

1B. 0.0000725

5

7.25×10^{-5}

4

7.25×10^{-5}

What does 10^2 mean?

↓

$10 \cdot 10$

100

WatchOut!

Negative Signs Be careful about the placement of negative signs. A negative sign in the exponent means that the number is between 0 and 1. A negative sign before the number means that it is less than 0.

KeyConcept Scientific Notation to Standard Form

Step 1 In $a \times 10^n$, note whether $n > 0$ or $n < 0$.

Step 2 If $n > 0$, move the decimal point n places right.
If $n < 0$, move the decimal point $-n$ places left.

Step 3 Insert zeros, decimal point, and commas as needed for place value.

x100...x10...etc. makes a number bigger (move decimal pt to right)

Example 2 Scientific Notation to Standard Form

Express each number in standard form.

a. 6.32×10^9

6,320,000,000

"times a decimal" = gets smaller (how much smaller?)

b. 4×10^{-7} +7

.0000004

2A. 3.201×10^{6}

3,201,000

2B. 9.03×10^{-5}

.0000903

Commutative property of multiplication

Example 3 Multiply with Scientific Notation

Evaluate $(3.5 \times 10^{-3})(7 \times 10^{5})$. Express the result in both scientific notation and standard form.

$(3.5)(7)(10^{-3})(10^{5})$

$+1$

$2-$

-1

S.N. 24.5×10^{2}

2.45×10^{3}

ST 2450

Answer in sci notation and/or standard form
Follow directions

GuidedPractice

Evaluate each product. Express the results in both scientific notation and standard form.

3A. $(6.5 \times 10^{12})(8.7 \times 10^{-15})$

$(6.5)(8.7)10^{12}10^{-15}$

56.55×10^{-3} (+1, −1)

5.655×10^{-2}

$.06655$

3B. $(7.8 \times 10^{-4})^2$

$7.8 \times 10^{-4} \cdot 7.8 \times 10^{-4}$

60.84×10^{-8} (+1, −1)

6.084×10^{-7}

$.0000006084$

Grouping

Example 4 Divide with Scientific Notation

Evaluate $\frac{3.066 \times 10^8}{7.3 \times 10^3}$. Express the result in both scientific notation and standard form.

WB 7.4 prac.
1-14 all

Evaluate each quotient. Express the results in both scientific notation and standard form.

4A. $\dfrac{2.3958 \times 10^3}{1.98 \times 10^8}$

4B. $\dfrac{1.305 \times 10^3}{1.45 \times 10^{-4}}$

Real-World Example 5 Use Scientific Notation

MUSIC In the United States, a CD reaches gold status once 500 thousand copies are sold. A CD reaches platinum status once 1 million or more copies are sold.

a. Express the number of copies of CDs that need to be sold to reach each status in standard notation.

Real-World Link

The platinum award was created in 1976. In 2004, the criteria for the award was extended to digital sales. The top-selling artist of all time is the Beatles with 170 million units sold.

Source: Recording Industry Association of America

b. Write each number in scientific notation.

c. How many copies of a CD have sold if it has gone platinum 13 times? W
your answer in scientific notation and standard form.