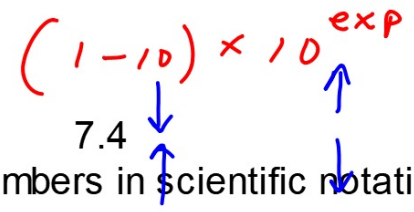


Algebra 1 7.4

*8th grade standard

Express numbers in scientific notation*

Find products and quotients of numbers in scientific notation

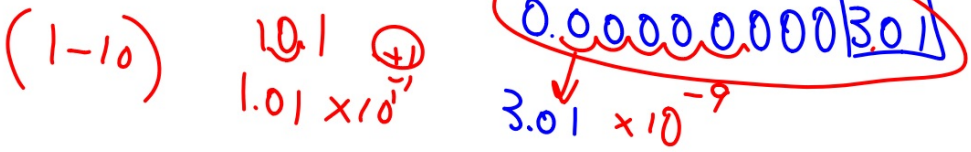
scientific notation

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 10)

→ 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 +8 −8

201

2.01×10^{8}

0.000051

+5
−5

5.1×10^{-5}

−5

5.1

Guided Practice

1A. 68,700,000,000

6.87×10^{10}

1B. 0.0000725

7.25×10^{-5}

"Standard notation"

What does 10^2 mean?

$10^2 = 10 \cdot 10 = 100$

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}

0.0000004

2A. 3.201×10^{6}

3,201,000.

2B. 9.03×10^{-5}

0.0000903

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.

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

24.5×10^{2} (+1, −1)

24.5 → 2.45

2.45×10^{3}

2450

$(8.6 \times 10^{4})(4.5 \times 10^{3})$

$(8.6)(4.5) \times 10^{4} \times 10^{3}$

38.7×10^{7} (+1, −1)

3.87×10^{8}

Answer in sci notation and/or standard form
Follow directions

WB 7.4 skills 1–11 odd
13–22 all

GuidedPractice

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

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

$56.55 \times 10^{12} \cdot 10^{-15}$

56.55×10^{-3} (+1) -1

5.655×10^{-2}

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

$(7.8 \times 10^{-4})(7.8 \times 10^{-4})$

60.84×10^{-8} (+1) -1

6.084×10^{-7}

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.

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.