RSCS Name:_____

Class:_____ Date:_____

Engage:

Find the value of the following. 2×10^4 and 2×10^{-4}

$2 \times 10^4 =$ _____

$2 \times 10^{-4} =$ _____

Model:

The planet Venus is more than 60,000,000 miles from the Sun. Write this number as the product of two factors:

(a number greater than or equal to 1 but less than 10) $\times$ (a power of 10)

Scientists often work with very large numbers, such as the distance from Venus to the Sun or the number of cells in a human body. Writing and calculating with very large numbers can be tedious and inconvenient.

When you wrote 60,000,000 as 6×10^7, you used **scientific notation**. Scientific notation uses exponents to make it easier to work with very large or very small numbers. To write a number using scientific notation, write it as a product of two factors:

a number that is greater than or equal to 1 but less than 10 — 6×10^7 — a power of 10

To write the number 1,850,000 in scientific notation,

$1{,}850{,}000 = 1.850000.$ Move the decimal point to get a number that is at least 1, but less than 10.

$= 1.85 \times 10^6$ The power of 10 is equal to **the number of place values that the decimal point moved**.

The power doesn't tell you the number of zeros in the standard form of the number. Rather, it tells you the greatest place value of the number.

To write the number 3.54×10^5 in standard form, we move each digit in 3.54 up 5 place values by **moving the decimal point 5 places to the right**, because we are multiplying by 10^5.

$$3.54 \times 10^5 = 3.54000 = 354{,}000$$

To translate between scientific notation and standard notation, change the place values of the digits by moving the decimal point according to the power of 10.

Reflect

1 Write 6.85×10^8 in standard form. Show your work.

100	$10 \cdot 10$	10^2
10	10	10^1
1	1	10^0
0.1	$\frac{1}{10} = \frac{1}{10^1}$	10^{-1}
0.01	$\frac{1}{10 \cdot 10} = \frac{1}{10^2}$	10^{-2}
0.001	$\frac{1}{10 \cdot 10 \cdot 10} = \frac{1}{10^3}$	10^{-3}
0.0001	$\frac{1}{10 \cdot 10 \cdot 10 \cdot 10} = \frac{1}{10^4}$	10^{-4}

Convert the following numbers into scientific notation:

1) 3,400 _____

2) 0.000023 _____

3) 101,000 _____

4) 0.010 _____

Convert the following numbers into standard notation:

9) 2.30×10^{4} _____

10) 1.76×10^{-3} _____

11) 1.901×10^{-7} _____

12) 8.65×10^{-1} _____

CFU:

Try It **Use what you just learned to solve these problems. Show your work on a separate sheet of paper.**

10 Write 63,120,000 in scientific notation. _____

11 Write 9.054×10^{-6} in standard form. _____

5) 45.01 _____

6) 1,000,000 _____

7) 0.00671 _____

8) 4.50 _____

13) 9.11×10^{3} _____

14) 5.40×10^{1} _____

15) 1.76×10^{0} _____

16) 7.4×10^{-5} _____

We Do:

Convert to scientific notation

1) 2,300,000,000

2) 0.0000000157

3) 2.4

Convert to standard form

1) 2.4×10^5

2) 6.134×10^{-4}

3) 3.6×10^0

You Do:

Change standard form to scientific notation

1. **0.65**

2. **0.24**

3. **25,000,000**

4. **71,000**

Change scientific notation to standard form

5. **1.2×10^5**

6. **6.4×10^4**

7. **3.4×10^{-5}**

8. **3.21×10^4**

Convert from scientific notation to standard form.

1) 4.83×10^{-3}

2) 9×10^{3}

3) 8.2×10^{0}

4) 8.291×10^{-3}

5) 1.939×10^{3}

6) 3.4×10^{-3}

Convert from standard form to scientific notation.

11) 8.58

12) 0.0000076

13) 0.0000038

14) 0.0002829

15) 2.55

16) 980,000

19 Earth is about 5,974,000,000,000,000,000,000,000 kg. Write this number in scientific notation.

Show your work.

Use the information in the table to solve the problem.

Orbiting Body	Approximate Distance from the Sun (in miles)
Mercury	36,300,000
Mars	142,000,000
Neptune	2,800,000,000
Pluto	3,670,000,000

Show your work.

Write each distance in scientific notation.

Mercury _____

Mars _____

Neptune _____

Pluto _____

Which is equivalent to 8.03×10^{-8}?

A −803,000,000

B −0.0000000803

C 0.0000000803

D 803,000,000

5 The number 0.003 written in scientific notation is 3×10^{-3}. Why is the exponent negative?

_____

_____

6 Write 0.00052 in scientific notation.

_____

7 Is 4.23×10^{-5} greater than 1 or less than 1? Explain how you know.

_____

_____

_____

8 Sylvester says that 0.000002015 written in scientific notation is 2.015×10^{6}. Do you agree with him? Explain why or why not.

_____

_____

RSCS

Name:_____

Class:_____

Date:_____-

HOMEWORK

1 Which of the following expressions is equivalent to 4,325,000,000?

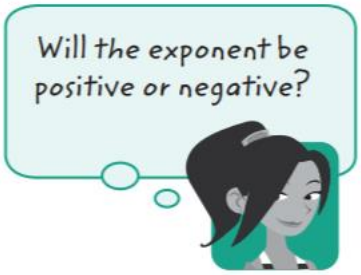
A 4.325×10^{-9}

B 4.325×10^{-6}

C 4.325×10^{6}

D 4.325×10^{9}

Carson chose **A** as the correct answer. How did he get that answer?

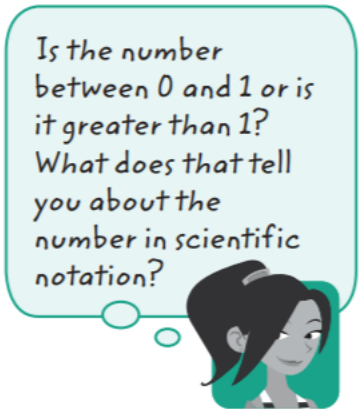


_____

_____

5 Write 0.0000003105 in scientific notation. Explain how you found your answer.

Show your work.



Solution: _____

1 Which of the following expressions is equivalent to 5,710,900?

A 5.7109×10^{-6}

B 5.7109×10^{2}

C 5.7109×10^{3}

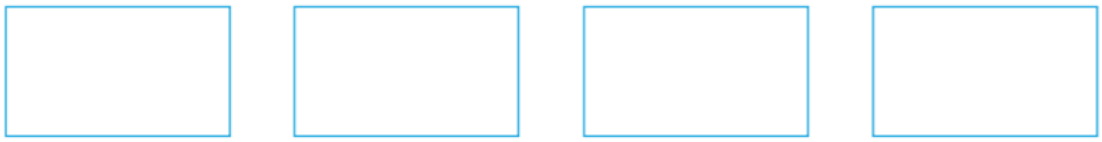
D 5.7109×10^{6}

Write the following numbers in order from ***least*** to ***greatest***.

5×10^{-6} -9×10^{-3}

-0.0000002 0.00007

Least ⟶ Greatest



Determine if each equation is true.

Choose *True* or *False* for each equation.

a. $4.25 \times 10^{6} = 425{,}000$ ☐ True ☐ False

b. $6.38 \times 10^{9} = 638{,}000{,}000{,}000$ ☐ True ☐ False

c. $5.11 \times 10^{-2} = 511$ ☐ True ☐ False

d. $2.79 \times 10^{-4} = 0.000279$ ☐ True ☐ False