

Math 8

Our Goal: To learn about scientific notation

Warm Up: Exponent review

5,000,000

Today's Homework

Day 2 - 10.6 Exercises, p.446: 1-21

(will be done in class due to homework-free zone)

Previous Homework

Day 1 - 10.5 Exercises, p.440: 1-24

$$\begin{array}{c}
 \frac{5}{10 \cdot 10 \cdot 10} \times 10^6 \\
 \text{10 times} \\
 5,000,000 = 5 \times 1,000,000 \\
 \text{5} \times 10^6
 \end{array}$$

$$4.4 \times 10^{-5} \quad 1$$

$$= 0.000044$$



$$0.000044$$

Don't guess!

$$4.4 \times 10^5$$

$$4.400,000$$
$$440000$$

$$44.$$

$$4.4 \times 10^{-1} = 44.$$



Essential Question

How can you read numbers that are written in scientific notation?

Key Idea

Scientific Notation

A number is written in **scientific notation** when it is represented as the product of a factor and a power of 10. The factor must be greater than or equal to 1 and less than 10.

The factor is greater than or equal to 1 and less than 10.

$$8.3 \times 10^{-7}$$

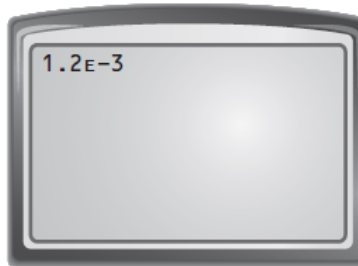
The power of 10 has an integer exponent.

Write the number shown on the calculator display in standard form.

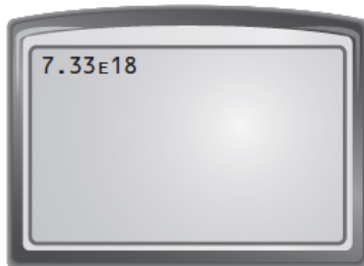
1.



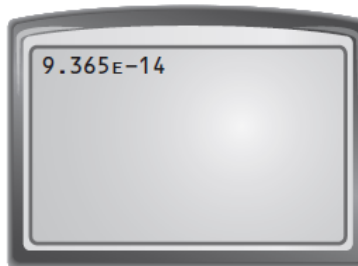
2.



3.



4.



Tell whether the number is written in scientific notation.
Explain.

a. 5.9×10^{-6}

b. 0.9×10^8

Key Idea

Writing Numbers in Standard Form

The absolute value of the exponent indicates how many places to move the decimal point.

- If the exponent is **negative**, move the decimal point to the **left**.
- If the exponent is **positive**, move the decimal point to the **right**.

a. Write 3.22×10^{-4} in standard form.

b. Write 7.9×10^5 in standard form.

1. Is 12×10^4 written in scientific notation? Explain.

Write the number in standard form.

2. 6×10^7

3. 9.9×10^{-5}

4. 1.285×10^4

A dog has 100 female fleas. How much blood do the fleas consume per day?



A female flea consumes about 1.4×10^{-5} liter of blood per day.

Write the number in scientific notation.

1. 0.00034

2. 6,750,000

3. 0.00000007

4. 125,000

5. 15,200,000,000

6. 0.000000000917

Key Idea

Writing Numbers in Scientific Notation

Step 1: Move the decimal point so it is located to the right of the leading nonzero digit.

Step 2: Count the number of places you moved the decimal point. This indicates the exponent of the power of 10, as shown below.

Number Greater Than or Equal to 10

Use a positive exponent when you move the decimal point to the left.

$$8600 = 8.6 \times 10^3$$

3

Number Between 0 and 1

Use a negative exponent when you move the decimal point to the right.

$$0.0024 = 2.4 \times 10^{-3}$$

3

Elon Musk purchased Twitter for \$44,000,000,000. Write this number in scientific notation.

Google purchased YouTube for \$1,650,000,000. Write this number in scientific notation.

The 2004 Indonesian earthquake slowed the rotation of Earth, making the length of a day 0.00000268 second shorter. Write this number in scientific notation.

Write the number in scientific notation.

1. 50,000

2. 25,000,000

3. 683

4. 0.005

5. 0.00000033

6. 0.000506

An album has sold 8,780,000 copies. How many more copies does it need to sell to receive the award?



An album receives an award when it sells 10,000,000 copies.

- (A)** 1.22×10^{-7}
- (B)** 1.22×10^{-6}
- (C)** 1.22×10^6
- (D)** 1.22×10^7

The table shows when the last three geologic eras began. Order the eras from earliest to most recent.



Era	Began
Paleozoic	5.42×10^8 years ago
Cenozoic	6.55×10^7 years ago
Mesozoic	2.51×10^8 years ago

The land area of Virginia is about 39,500 square miles. The land area of Alaska is about 570,000 square miles. The United States land area is about 3,500,000 square miles. Write each of these in scientific notation.

10.5 Exercises



Vocabulary and Concept Check

- WRITING** Describe the difference between scientific notation and standard form.
- WHICH ONE DOESN'T BELONG?** Which number does *not* belong with the other three? Explain.

2.8×10^{15}

4.3×10^{-30}

1.05×10^{28}

10×9.2^{-13}

Practice and Problem Solving

Write the number shown on the calculator display in standard form.

3. $5.6E12$

4. $2.1E-10$

5. $8.73E16$

Tell whether the number is written in scientific notation. Explain.

6. 1.8×10^9

7. 3.45×10^{14}

8. 0.26×10^{-25}

9. 10.5×10^{12}

10. 46×10^{-17}

11. 5×10^{-19}

12. 7.814×10^{-36}

13. 0.999×10^{42}

14. 6.022×10^{23}

Write the number in standard form.

15. 7×10^7

16. 8×10^{-3}

17. 5×10^2

18. 2.7×10^{-4}

19. 4.4×10^{-5}

20. 2.1×10^3

21. 1.66×10^9

22. 3.85×10^{-8}

23. 9.725×10^0

24. **ERROR ANALYSIS** Describe and correct the error in writing the number in standard form.

$4.1 \times 10^{-6} = 4,100,000$



2.7×10^6 platelets per milliliter

25. **PLATELETS** Platelets are cell-like particles in the blood that help form blood clots.
- How many platelets are in 3 milliliters of blood? Write your answer in standard form.
 - An adult human body contains about 5 liters of blood. How many platelets are in an adult human body?

10.6 Exercises



Vocabulary and Concept Check

- REASONING** How do you know whether a number written in standard form will have a positive or a negative exponent when written in scientific notation?
- WRITING** When is it appropriate to use scientific notation instead of standard form?

Practice and Problem Solving

Write the number in scientific notation.

- | | | |
|-------------------|-----------------------|----------------|
| 3. 0.0021 | 4. 5,430,000 | 5. 321,000,000 |
| 6. 0.00000625 | 7. 0.00004 | 8. 10,700,000 |
| 9. 45,600,000,000 | 10. 0.000000000009256 | 11. 840,000 |

ERROR ANALYSIS Describe and correct the error in writing the number in scientific notation.

12. 3.6×10^5

13. 72.5×10^6

Order the numbers from least to greatest.

- | | |
|--|---|
| 14. 1.2×10^3 , 1.19×10^3 , 1.12×10^3 | 15. 6.8×10^{-5} , 6.09×10^{-5} , 6.78×10^{-5} |
| 16. 5.76×10^{12} , 9.66×10^{11} , 5.7×10^{10} | 17. 4.8×10^{-6} , 4.8×10^{-5} , 4.8×10^{-8} |
| 18. 9.9×10^{-15} , 1.01×10^{-14} , 7.6×10^{-15} | 19. 5.78×10^{23} , 6.88×10^{23} , 5.82×10^{23} |

20. **HAIR** What is the diameter of a human hair written in scientific notation?



Diameter: 0.000099 meter

21. **EARTH** What is the circumference of Earth written in scientific notation?



Circumference at the equator: about 40,100,000 meters

22. **CHOOSING UNITS** In Exercise 21, name a unit of measurement that would be more appropriate for the circumference. Explain.