Bellringer

1. Simplify the expression by using an exponent.

   $3 \times 3 \times 3 \times 3 =$

2. Solve the equation for x

   $x^2 = 81$

3. The expression 5^{-1} can also be written as what fraction?

4. Complete the equation:

   $3^2 \times 3^7 = 3^{—}$

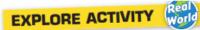# 2.2 Scientific Notation with Positive Powers of 10

8.EE.3
Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other

Vocabulary

Scientific Notation - method of expressing very large and very small numbers as a product of a number greater than or equal to 1 and less than 10, and a power of 10

$$ex: 3.21 \times 10^5$$

Standard Notation - a number that is completely written in numerical for

$$ex: 321,000$$

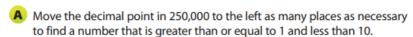**EXPLORE ACTIVITY** *Real World* | COMMON CORE | 8.EE.3

Using Scientific Notation

Scientific notation is a method of expressing very large and very small numbers as a product of a number greater than or equal to 1 and less than 10, and a power of 10.

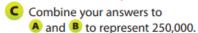**The weights of various sea creatures are shown in the table. Write the weight of the blue whale in scientific notation.**

Sea Creature	Blue whale	Gray whale	Whale shark
Weight (lb)	250,000	68,000	41,200

A Move the decimal point in 250,000 to the left as many places as necessary to find a number that is greater than or equal to 1 and less than 10.

What number did you find? _____ 2.5 _____

250,000

B Divide 250,000 by your answer to **A**. Write your answer as a power of 10.

_____ 100,000 _____ ; 10^5 _____

41,200

C Combine your answers to **A** and **B** to represent 250,000.

$250,000 = \boxed{2.5} \times 10^{5}$

Repeat steps **A** through **C** to write the weight of the whale shark in scientific notation.

$41,200 = \boxed{4.12} \times 10^{4}$

Writing a Number in Scientific Notation

- To translate between Standard notation and Scientific notation, you count the number of places the decimal point moves

- When Standard formation is greater than or equal to 10, use a positive exponent

EXAMPLE 1 Real World   COMMON CORE 8.EE.3

The distance from Earth to the Sun is about 93,000,000 miles. Write this distance in scientific notation.

STEP 1 Move decimal in 93,000,000 to the left until we find a number greater than or equal to 1 and less than 10

$$93,000,000 = 9.3$$

STEP 2 Divide our original number by the result (count how many decimal places you moved)

$$= 10,000,000 \qquad = 7 \text{ places}$$

STEP 3 Write product of the result

$$9.3 \times 10^7$$

Is 12×10^{7} written in Scientific notation?

No, because 12 is greater than 10

＊ Check definition of scientific notation

ADDITIONAL EXAMPLE 1

The average distance from Earth to Mars is about 140,000,000 miles. Write this distance in scientific notation.

$$1.4 \times 10^8$$

140,000,000.

YOUR TURN

Write each number in scientific notation.

3. 6,400

6.4×10^{3}

4. 570,000,000,000

5.7×10^{11}

5. A light-year is the distance that light travels in a year and is equivalent to 9,461,000,000,000 km. Write this distance in scientific notation.

9.461×10^{12}

Writing a Number in Standard Notation

- To translate from Scientific notation to standard notation, move decimal point the number of places indicated by the exponent in the power of 10

- When exponent is positive, move decimal to the right and add place holder zeros where needed

EXAMPLE 2

COMMON CORE **8.EE.3**

Write 3.5×10^6 in standard notation.

STEP 1 Use to exponent to see how many places to move decimal

6 places

STEP 2 Move decimal and add zeros where needed

$3.5000000 = 3,500,000$

ADDITIONAL EXAMPLE 2

Write 7.8×10^9 in standard notation.

7.8 0 0 0 0 0 0 0 0.

7,8 00,000,000

YOUR TURN

Write each number in standard notation.

8. 7.034×10^9

7,034,000,000

9. 2.36×10^5

236,000

10. The mass of one roosting colony of Monarch butterflies in Mexico was estimated at 5×10^6 grams. Write this mass in standard notation.

5,000,000 grams

Guided Practice

Write each number in scientific notation. (Explore Activity and Example 1)

1. 58,927
Hint: Move the decimal left 4 places.

_____

2. 1,304,000,000
Hint: Move the decimal left 9 places.

_____

3. 6,730,000

_____

4. 13,300

_____

5. An ordinary quarter contains about
97,700,000,000,000,000,000,000 atoms.

_____

6. The distance from Earth to the Moon is
about 384,000 kilometers.

_____

Write each number in standard notation. (Example 2)

7. 4×10^5
Hint: Move the decimal right 5 places.

_____

8. 1.8499×10^9
Hint: Move the decimal right 9 places.

_____

9. 6.41×10^3

_____

10. 8.456×10^7

_____

11. 8×10^5

_____

12. 9×10^{10}

_____

13. Diana calculated that she spent about 5.4×10^4 seconds doing her math homework during October. Write this time in standard notation. (Example 2)

_____

14. The town recycled 7.6×10^6 cans this year. Write the number of cans in standard notation. (Example 2)

_____

HW

GP 1-15

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