4.7 Scientific Notation

Using Scientific Notation

Goal: Write numbers using scientific notation.

A number written in 3 parts

$$ex: 4.2 \times 10^4$$

① a number greater than or equal to 1 AND less than 10

CAN'T use larger place value than ONES

ex: 3

ex: 4.2

② "x" for multiply

③ a power of 10

Example 1 | *Writing Numbers in Scientific Notation*

a. The average distance Mars is from the sun is 141,600,000 miles. Write this number in scientific notation.

Standard form **Product form** **Scientific notation**

Moves to
the Left,
Positive
Exponent.

Mars to Sun is 141, 600, 000 miles

Standard
Form
"normal" "regular"

141,600,000

Product
Form

1.416   hundred millions

1.416 × 100,000,000

Scientific
Notation

1.416 × 10^8

write as power of 10

b. The diameter of a quarter-ounce gold American Eagle coin is 0.022 meter. Write this number in scientific notation.

Standard form	Product form	Scientific notation
0.022	2.2 × 0.01	

diameter of coin is 0.022 meters

Right → negative exponent

Standard

0.022

$\dfrac{22}{1000}$

same $\dfrac{2.2}{100}$

hint → write as a fraction

Product

2.2 × 0.01

↑ hundredths

Scientific Notation

2.2×10^{-2}

22×10^{-3}

Not Sci Notation

Example 3   *Ordering Numbers Using Scientific Notation*

Order 5.3×10^5, 520,000, and 7.5×10^4 from least to greatest.

1. Write each number in scientific notation if necessary.

520,000 = ⬜

5.3×10^5

7.5×10^4

$5,20,000.$

5.2×10^5

$7.5 \times 10^4, \ 520,000, \ 5.3 \times 10^5$

Example 4   *Multiplying Numbers in Scientific Notation*

Oxygen Atoms The volume of one mole of oxygen atoms is about 1.736×10^{-5} cubic meters. Find the volume of 1.5×10^4 moles of oxygen atoms.

Solution

Total volume	=	Volume of one mole of oxygen atoms	×	Number of moles

$$V = \left(1.736 \times 10^{-5}\right)\left(1.5 \times 10^4\right)$$

$$1.736 \times 1.5 \times 10^{-5} \times 10^4$$

$$2.604 \times 10^{-5+4}$$

$$2.604 \times 10^{-1}$$

Volume mole oxygen
$$1.736 \times 10^{-5} \, m^3$$

Find Volume
of 1.5×10^4 moles oxygen

b. The diameter of a quarter-ounce gold American Eagle coin is 0.022 meter. Write this number in scientific notation.

Standard form	Product form	Scientific notation

diameter of coin is 0.022 meters

Standard

0.022

hint: write as fraction

$\frac{22}{1000}$

22 thousandths

Product

2.2×0.01

↑ hundredths

Scientific Notation

2.2×10^{-2}

look at the farthest RIGHT place value (hundredths) $\frac{1}{100} = \frac{1}{10^2} = 10^{-2}$

Read 4.7 & pgs 207-208:

#16-27, 33-41
46-53, 57-63

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