

10.7 Operations and Scientific Notation

Pick up Guided Notes
From Front Table

Learning Targets

- ★ • Re-write numbers with new/different powers of 10
- Add and Subtract
- Multiply and Divide

Rewriting Numbers with New Powers of 10

Scientific
Notation

27,000

NOT Scientific
Notation

Rewriting Numbers with New Powers of 10

Scientific
Notation

0.035

NOT Scientific
Notation

Rewriting Numbers with New Powers of 10

Scientific
Notation

NOT Scientific
Notation

$$7.6 \times 10^5 = \underline{\quad\quad\quad} \times 10^6$$

$$3.41 \times 10^8 = \underline{\quad\quad\quad} \times 10^7$$

$$4.8 \times 10^{-3} = \underline{\quad\quad\quad} \times 10^{-2}$$

$$5.2 \times 10^{-7} = \underline{\quad\quad\quad} \times 10^{-8}$$

NOW "Fix" these numbers. Adjust them so that they are correctly written in scientific notation.

$$87.6 \times 10^6$$

$$35.92 \times 10^8$$

$$47.81 \times 10^{-5}$$

$$96.38 \times 10^{-7}$$

Adding and Subtracting Numbers in Scientific Notation

If the powers of 10 are the **SAME**,
add or subtract the factors.

$$(3.2 \times 10^4) + (4.6 \times 10^4)$$

$$(3.2 + 4.6) \times 10^4$$

$$\begin{array}{r} \text{\textcircled{\#1}} \quad 32000 \\ + \quad 46000 \\ \hline 78000 \end{array}$$

$$7.8 \times 10^4$$

$$\begin{array}{r} 3.2 \\ + 4.6 \\ \hline \end{array}$$

$$7.8 \times 10^4$$

Adding and Subtracting Numbers in Scientific Notation

If the powers of 10 are the **SAME**,
add or subtract the factors.

$$7.2 \times 10^5 - 5.1 \times 10^5$$

$$\begin{array}{r} 7.2 \\ - 5.1 \\ \hline 2.1 \end{array} \quad 2.1 \times 10^5$$

#1

$$\begin{array}{r} 720000 \\ - 510000 \\ \hline 210000 \end{array}$$

$$2.1 \times 10^5$$

Adding and Subtracting Numbers in Scientific Notation

If the powers of 10 are the **DIFFERENT**, first rewrite one of the numbers so it has the same power of 10 as the other number.

Adding and Subtracting Numbers in Scientific Notation

If the powers of 10 are the **DIFFERENT**, first rewrite one of the numbers so it has the same power of 10 as the other number.

$$(5.81 \times 10^8) + (2.04 \times 10^7)$$
$$5.81 \times 10^8 + 0.204 \times 10^8 = 6.014 \times 10^8$$
$$\begin{array}{r} 5.810 \\ + 0.204 \\ \hline 6.014 \end{array}$$
$$\begin{array}{r} 581000000 \\ + 20400000 \\ \hline 601400000 \end{array}$$
$$6.014 \times 10^8$$

Adding and Subtracting Numbers in Scientific Notation

If the powers of 10 are the **DIFFERENT**, first rewrite one of the numbers so it has the same power of 10 as the other number.

$$(3.5 \times 10^{-2}) - (6.6 \times 10^{-3})$$

$$\boxed{} \quad 3.5 \times 10^{-2} - 0.66 \times 10^{-2} \quad \boxed{}$$

$$\begin{array}{r} 2 \quad 14 \quad 10 \\ 3.50 \\ - 0.66 \\ \hline 2.84 \end{array}$$

$$2.84 \times 10^{-2}$$

Adding and Subtracting Numbers in Scientific Notation

Multiple Steps!

$$(8.3 \times 10^6) + (9.7 \times 10^8)$$

$$0.083 \times 10^8 + 9.7 \times 10^8$$

$$\begin{array}{r} 0.083 \\ + 9.7 \\ \hline \end{array}$$

$$9.783 \times 10^8$$

**Addition and
Subtraction**

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Multiplying and Dividing Numbers in Scientific Notation

- Multiply or Divide the Factors
- Add or Subtract the Powers
- Adjust and rewrite in
Scientific Notation if needed

Multiplying and Dividing Numbers in Scientific Notation

Find $(3 \times 10^{-5}) \times (5 \times 10^{-2})$.

- Multiply or Divide the Factors
- Add the Powers
- Adjust and rewrite in Scientific Notation if needed

$$\begin{aligned}(3 \times 10^{-5}) \times (5 \times 10^{-2}) \\ &= 3 \times 5 \times 10^{-5} \times 10^{-2} \\ &= (3 \times 5) \times (10^{-5} \times 10^{-2}) \\ &= 15 \times 10^{-7}\end{aligned}$$

Multiplying and Dividing Numbers in Scientific Notation

Find $\frac{1.5 \times 10^{-8}}{6 \times 10^7}$.

- Multiply or Divide the Factors
- Add the Powers
- Adjust and rewrite in Scientific Notation if needed

$$\begin{aligned}\frac{1.5 \times 10^{-8}}{6 \times 10^7} &= \frac{1.5}{6} \times \frac{10^{-8}}{10^7} \\ &= 0.25 \times \frac{10^{-8}}{10^7} \quad 10^{-8-7} \\ &= 0.25 \times 10^{-15} \\ &= 0.00000000000000025 \\ &= 2.5 \times 10^{-16}\end{aligned}$$

Homework

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