

Operations with Numbers Expressed in Scientific Notation

Multiplication

When numbers in scientific notation are multiplied, only the number is multiplied. The exponents are added.

$$(2.00 \times 10^3)(4.00 \times 10^4) = (2.00)(4.00) \times 10^{3+4}$$

$$= 8.00 \times 10^7$$

Show work in boxes.

a.

$$8.6 \times 10^{14}$$

Division

When numbers in scientific notation are divided, only the number is divided. The exponents are subtracted.

$$\frac{9.60 \times 10^7}{1.60 \times 10^4} = \frac{9.60}{1.60} \times 10^{7-4}$$

$$= 6.00 \times 10^3$$

b.

$$9 \times 10^1$$

Perform the following operations and express the answers in scientific notation.

a. $(4.3 \times 10^8) \times (2.0 \times 10^6)$

b. $(6.0 \times 10^3) \times (1.5 \times 10^{-2})$

c. $(1.5 \times 10^{-2}) \times (8.0 \times 10^{-1})$

d. $\frac{7.8 \times 10^3}{1.2 \times 10^4}$

e. $\frac{8.1 \times 10^{-2}}{9.0 \times 10^2}$

f. $\frac{6.48 \times 10^5}{(2.4 \times 10^4)(1.8 \times 10^{-2})}$

c.

$$12 \times 10^{-3}$$

$$\boxed{1.2 \times 10^{-2}}$$

$$12 = 1.2 \times 10^1$$

e.

$$0.9 \times 10^{-4}$$

$$\boxed{9 \times 10^{-5}}$$

$$.9 = 9 \times 10^{-1}$$

d.

$$6.5 \times 10^{-1}$$

f.

$$\frac{6.48 \times 10^5}{4.32 \times 10^2} =$$

$$\boxed{1.5 \times 10^3}$$

Operations with Scientific Notation



Simplify. Write each answer in scientific notation. Round to three significant digits if needed.

1) $\frac{4.6 \times 10^{-3}}{3 \times 10^{-6}}$

7) $(5 \times 10^6)(2.6 \times 10^2)$

2) $(9 \times 10^{-5})(7.07 \times 10^{-3})$

8) $\frac{6.74 \times 10^{-5}}{9 \times 10^{-3}}$

3) $\frac{5 \times 10^4}{3 \times 10^3}$

9) $(3.6 \times 10^3)(5.1 \times 10^4)$

4) $\frac{9.9 \times 10^{-5}}{1.3 \times 10^{-6}}$

10) $(9.1 \times 10^5)(3.2 \times 10^3)$

5) $(5.8 \times 10^{-6})(6 \times 10^{-3})$

11) $\frac{9.7 \times 10^3}{5 \times 10^4}$

6) $(3.24 \times 10^{-4})(4.21 \times 10^{-6})$

12) $\frac{5.04 \times 10^4}{2.2 \times 10^2}$



Addition and Subtraction

Before numbers in scientific notation can be added or subtracted, the exponents must be equal.

↙ Not equal ↘
↙ Equal ↘

$$(3.4 \times 10^2) + (4.57 \times 10^3) = (0.34 \times 10^3) + (4.57 \times 10^3)$$

↑
↑

The decimal is moved to the left to increase the exponent.

$$= (0.34 + 4.57) \times 10^3$$

$$= 4.91 \times 10^3$$

$$\begin{array}{r} 4.57 \\ + 0.34 \\ \hline 4.91 \end{array}$$

Perform the following operations and express the answers in scientific notation.

a. $(1.2 \times 10^5) + (5.35 \times 10^6)$

$(.12 \times 10^6) + (5.35 \times 10^6) = 5.47 \times 10^6$

b. $(6.91 \times 10^{-2}) + (2.4 \times 10^{-3})$

$(6.91 \times 10^{-2}) + (.24 \times 10^{-2}) = 7.15 \times 10^{-2}$

$$\begin{array}{r} 6.91 \\ + .24 \\ \hline 7.15 \end{array}$$

c. $(9.70 \times 10^6) + (8.3 \times 10^5)$

$(9.7 \times 10^6) + (.83 \times 10^6) = 10.53 \times 10^6 = 1.053 \times 10^7$

$$\begin{array}{r} 9.7 \\ + .83 \\ \hline 10.53 \end{array}$$

d. $(3.67 \times 10^2) - (1.6 \times 10^1)$

$(3.67 \times 10^2) - (.16 \times 10^2) = 3.51 \times 10^2$

$$\begin{array}{r} 3.67 \\ - .16 \\ \hline 3.51 \end{array}$$

e. $(8.41 \times 10^{-5}) - (7.9 \times 10^{-6})$

$(8.41 \times 10^{-5}) - (.79 \times 10^{-5}) = 7.62 \times 10^{-5}$

$$\begin{array}{r} 8.41 \\ - .79 \\ \hline 7.62 \end{array}$$

f. $(1.33 \times 10^5) - (4.9 \times 10^4)$

$(1.33 \times 10^5) - (.49 \times 10^5) = 0.84 \times 10^5 = 8.4 \times 10^4$

$$\begin{array}{r} 1.33 \\ - .49 \\ \hline .84 \end{array}$$

Find the sums and differences. Write the letter of the answer that matches the problem.

_____ 1. $11 \times 10^4 + 5.8 \times 10^3$

a. 0.06285×10^8

_____ 2. $5 \times 10^5 + 11.10 \times 10^5$

b. -3.61×10^3

_____ 3. $3 \times 10^2 + 9.15 \times 10^3$

c. 16.10×10^5

_____ 4. $11 \times 10^5 + 7.5 \times 10^4$

d. -10.692×10^5

_____ 5. $21 \times 10^4 + 17.5 \times 10^3$

e. 117.5×10^4

_____ 6. $11 \times 10^2 - 4.71 \times 10^3$

f. 11.58×10^4

_____ 7. $13 \times 10^4 - 9.95 \times 10^2$

g. 22.75×10^3

_____ 8. $158 \times 10^2 - 10.85 \times 10^5$

h. 12.9005×10^4

_____ 9. $0.075 \times 10^8 - 12.15 \times 10^5$

i. 100