

Multiplying in Scientific Notation

1. Multiply the coefficients.
2. Add the exponents together.
3. If the new coefficient is 10 or greater, divide it by 10 and add 1 to the new exponent.

Examples

$$\begin{aligned} \bullet \quad 6 \times 10^4 \times 3 \times 10^9 &= 18 \times 10^{13} = 1.8 \times 10^{14} \\ \bullet \quad 2 \times 10^{-9} \times 8 \times 10^6 &= 16 \times 10^{-3} = 1.6 \times 10^{-2} \end{aligned}$$

Dividing in Scientific Notation

1. Divide the coefficients.
2. Subtract the exponents.
3. If the new coefficient is smaller than 1, multiply it by 10 and subtract 1 from the new exponent.

Example

$$\bullet \quad 4 \times 10^4 \div 5 \times 10^9 = 0.8 \times 10^{-5} = 8 \times 10^{-6}$$

Prefixes and Scientific Notation

prefix	symbol	meaning	multiplier	exponent
giga	G	billion	1 000 000 000	$\times 10^9$
mega	M	million	1 000 000	$\times 10^6$
kilo	k	thousand	1 000	$\times 10^3$
centi	c	hundredth	0.01	$\times 10^{-2}$
milli	m	thousandth	0.001	$\times 10^{-3}$
micro	μ	millionth	0.000 001	$\times 10^{-6}$
nano	n	billionth	0.000 000 001	$\times 10^{-9}$

Examples

- 5 GW (gigawatts) = 5×10^9 W
- 7 kN (kilonewtons) = 7×10^3 N
- 3 μ m (micrometres) = 3×10^{-6} m

Don't forget that the coefficient must always be at least 1 but less than 10.

Therefore:

$$\begin{aligned} 50 \text{ kN} &= 50 \times 10^3 \text{ N} &&= 5 \times 10^4 \text{ N} \\ 30 \text{ } \mu\text{m} &= 30 \times 10^{-6} \text{ m} &&= 3 \times 10^{-5} \text{ m} \\ 650 \text{ nm} &= 650 \times 10^{-9} \text{ m} &&= 6.5 \times 10^{-7} \text{ m} \end{aligned}$$