

I. Converting numbers to scientific notation

1. $0.00154 = 1.54 \times 10^{-3}$
2. $105060 = 1.0506 \times 10^5$
3. $-0.00221 = 2.21 \times 10^{-3}$
4. $-125,000 = -1.25 \times 10^5$
5. $-10.23 = -1.023 \times 10^1$
6. $1,525,000,000 = 1.525 \times 10^9$
7. $0.198 = 1.98 \times 10^{-1}$
8. $-0.01023 = -1.023 \times 10^{-2}$
9. $602200000 = 6.022 \times 10^8$

II. Multiplication of numbers in scientific notation

1. $(1.0 \times 10^7)(2.1 \times 10^3) = (1.0)(2.1)(10^7)(10^3) = 2.1 \times 10^{7+3} = 2.1 \times 10^{10}$
2. $(9.2 \times 10^6)(4.3 \times 10^2) = (9.2)(4.3)(10^6)(10^2) = 39.56 \times 10^{6+2} = 39.56 \times 10^8$
 $= 3.9 \times 10^9$
3. $(6.26 \times 10^{-3})(3.21 \times 10^{14}) = (6.26)(3.21)(10^{-3})(10^{14}) = 20.09 \times 10^{14-3}$
 $= 2.01 \times 10^{12}$
4. $(6.022 \times 10^{23})(1.981 \times 10^{-19}) = (6.022)(1.981)(10^{23})(10^{-19}) = 11.93 \times 10^{23-19}$
 $= 11.93 \times 10^4 = 1.193 \times 10^5$
5. $(6.022 \times 10^{23})(2 \times 10^2) = (6.022)(2)(10^{23})(10^2) = 12.044 \times 10^{23+2}$
 $= 12.044 \times 10^{25} = 1 \times 10^{26}$
6. $(3.11 \times 10^{18})(3.25 \times 10^{-19}) = (3.11)(3.25)(10^{18})(10^{-19}) = 10.1 \times 10^{18-19}$
 $= 10.1 \times 10^{-1} = 1.01$
7. $(4.2822 \times 10^3)(3 \times 10^{-5}) = (4.2822)(3)(10^3)(10^{-5}) = 12.847 \times 10^{3-5}$
 $= 12.847 \times 10^{-2} = 1.2 \times 10^{-1}$

8. $(2.2 \times 10^{-4})(5.11 \times 10^{-11}) = (2.2)(5.11)(10^{-4})(10^{-11}) = 11.24 \times 10^{-4-11}$
 $= 11.24 \times 10^{-15} = 1.1 \times 10^{-14}$
9. $(0.334)(7.1 \times 10^{-10}) = (0.334)(7.1)(10^{-10}) = 2.4 \times 10^{-10}$
10. $(101,325)(1.981 \times 10^{-19}) = (101325)(1.981)(10^{-19}) = 200726 \times 10^{-19}$
 $= 2.007 \times 10^{-14}$

III. Division of numbers in scientific notation

1. $\frac{2.1 \times 10^4}{1.1 \times 10^2} = \frac{2.1}{1.1} \cdot \frac{10^4}{10^2} = 1.9 \times 10^{4-2} = 1.9 \times 10^2$
2. $\frac{1.91 \times 10^8}{2.25 \times 10^{11}} = \frac{1.91}{2.25} \cdot \frac{10^8}{10^{11}} = 0.849 \times 10^{8-11} = 0.849 \times 10^{-3} = 8.49 \times 10^{-4}$
3. $\frac{6.022 \times 10^{23}}{1.55 \times 10^{18}} = \frac{6.022}{1.55} \cdot \frac{10^{23}}{10^{18}} = 3.88 \times 10^{23-18} = 3.88 \times 10^5$
4. $\frac{2.381 \times 10^{-9}}{6.8 \times 10^{-6}} = \frac{2.381}{6.8} \cdot \frac{10^{-9}}{10^{-6}} = 0.350 \times 10^{-9-(-6)} = 0.350 \times 10^{-3} = 3.5 \times 10^{-4}$
5. $\frac{1 \times 10^{-15}}{2 \times 10^2} = \frac{1}{2} \cdot \frac{10^{-15}}{10^2} = 0.5 \times 10^{-15-2} = 0.5 \times 10^{-17} = 5 \times 10^{-18}$
6. $\frac{5.749 \times 10^6}{2.11 \times 10^{11}} = \frac{5.749}{2.11} \cdot \frac{10^6}{10^{11}} = 2.725 \times 10^{6-11} = 2.72 \times 10^{-5}$