Orders of Magnitude

Let us say that the height of A = 1,000 (1×10^3) I moved the decimal point 3 places to the left.
the height of B = 100
the height of C = 10
the height of D = 1
the height of E = 0.1
the height of F = 0.01
the height of G = 0.001 = 1×10^{-3}

<— I am going down by ONE order of magnitude each time.

The decimal point was moved **3** places to the right, therefore 10^{-3}

the height of H = 0.000 1
the height of I = 0.000 01
the height of J = 0.000 001
the height of K = 0.000 000 1
the height of L = 0.000 000 01 = 1×10^{-8}

The decimal point was moved **8** places to the right, therefore 10^{-8}

Q1) How many orders of magnitude is A greater than B?

A1) $\frac{A}{B} = \frac{1{,}000}{100} = 10 = 10^1$ therefore A is **one** order of magnitude greater than B.

Q2) How many orders of magnitude is A greater than C?

A2) $\frac{A}{C} = \frac{1{,}000}{10} = 100 = 10^2$ therefore A is **two** orders of magnitude greater than C.

Q3) How many orders of magnitude is A greater than D?

A3) $\frac{A}{D} = \frac{1{,}000}{1} = 1{,}000 = 10^3$ therefore A is **three** orders of magnitude greater than D.

Q4) How many orders of magnitude is A greater than E?

A4) $\frac{A}{E} = \frac{1{,}000}{0.1} = \frac{10^3}{10^{-1}} = 10^4$ therefore A is **four** orders of magnitude greater than E.

Q5) How many orders of magnitude is A greater than G?

A5) $\frac{A}{G} = \frac{1{,}000}{0.001} = \frac{10^3}{10^{-3}} = 10^6$ therefore A is **six** orders of magnitude greater than G

Please remember that $\frac{10^3}{10^{-3}} = 10^3 \times 10^3 = \mathbf{10^6}$.

Q6) How many orders of magnitude is G greater than L?

A6) $\frac{G}{L} = \frac{0.001}{1 \times 10^{-8}} = \frac{10^{-3}}{10^{-8}} = 10^5$ therefore G is **five** orders of magnitude greater than L.

Please remember that $\frac{10^{-3}}{10^{-8}} = 10^{-3} \times 10^8 = \mathbf{10^5}$.

Now this is slightly different question (and please remember that " 1×10^n " = " 10^n ").

Q7) What is the relationship of J to A?

A7) $\frac{J}{A} = \frac{0.000\,001}{1{,}000} = \frac{10^{-6}}{10^3} = 10^{-6} \times 10^{-3} = 10^{(-6-3=-9)} = 10^{-9}$

and the answer is that "J" is 9 orders of magnitude SMALLER than A.