## Full Decimal Form to Scientific Notation

LI

- Know how to write numbers in Scientific Notation.

SC

- Know how to move a decimal point in the correct direction.
- Use the 4-step strategy.

Scientific notation (aka standard form) is a short way of writing VEDYBGG and very small numbers

## $a \times 10^{n}$

$a$ is any number (usually decimal) between 1 and 10 (not equal to 10 )
$n$ is an integer (..., - 2, - $1,0,1,2, \ldots$ )

$$
\begin{aligned}
& 10^{1} \text { means } 10 \\
& 10^{2} \text { means } 10 \times 10=100 \\
& 10^{3} \text { means } 10 \times 10 \times 10=1000 \\
& \text { etc. } \\
& (\times 100) \\
& 10^{-1} \text { means } \frac{1}{10} \\
& 10^{-2} \text { means } \frac{1}{10^{2}}=\frac{1}{100} \\
& 1000) \\
& 10^{-3} \text { means } \frac{1}{10^{3}}=\frac{1}{1000}(\div 100)
\end{aligned}
$$

etc.

## Literacy Links:

| Prefix | Symbol | $10^{n}$ | Decimal Form | Name |
| :---: | :---: | :---: | :--- | :--- |
| yotta | y | $10^{24}$ | 1000000000000000000000000 | Septillion |
| zetta | Z | $10^{21}$ | 100000000000000000000 | Sextillion |
| exa | E | $10^{18}$ | 1000000000000000000 | Quintillion |
| peta | p | $10^{15}$ | 1000000000000000 | Quadrillion |
| tera | T | $10^{12}$ | 1000000000000 | Trillion |
| giga | $G$ | $10^{9}$ | 1000000000 | Billion |
| mega | M | $10^{6}$ | 1000000 | Million |
| kilo | k | $10^{3}$ | 1000 | Thousand |
| hecto | h | $10^{2}$ | 100 | Hundred |
| deca | da | $10^{1}$ | 10 | Ten |
|  |  | $10^{0}$ | 1 | One |
| deci | d | $10^{-1}$ | 0.1 | Tenth |
| centi | c | $10^{-2}$ | 0.01 | Hundredth |
| milli | m | $10^{-3}$ | 0.001 | Thousandth |
| micro | $\mu$ | $10^{-6}$ | 0.000001 | Millionth |
| nano | n | $10^{-9}$ | 0.000000001 | Billionth |
| pico | p | $10^{-12}$ | 0.000000000001 | Trillionth |
| femto | f | $10^{-15}$ | 0.000000000000001 | Quadrillionth |
| atto | $a$ | $10^{-18}$ | 0.000000000000000001 | Quintillionth |
| zepto | $z$ | $10^{-21}$ | 0.000000000000000000001 | Sextillionth |
| yocto | y | $10^{-24}$ | 0.000000000000000000000001 | Septillionth |

How to Write Any Decimal Number in Scientific Notation

Step 1 : From the left, write down the first number that's not zero.
Step 2 : Put a decimal point after this number.
Step 3 : Write down the other numbers in order.
Step 4 : Then write $\times 10^{n}$, where $n$ is the number of decimal places moved to get to the number in the question (positive if moved to right; negative if moved to left; zero if not moved).

## Example 1

Write 48300 in scientific notation.

$$
48300.0
$$

## Example 2

Write 0.0756 in scientific notation.

$$
\begin{aligned}
& \overbrace{7} 56 \\
& 0.0756 \\
& 0.0756=7.56 \times 10^{-2}
\end{aligned}
$$

## Example 3

Write 3.431 in scientific notation.

$$
3.431=3.431 \times 10^{0}
$$

Write these numbers in scientific notation:

1) 0.00367
2) 46000
3) 1665000
4) 9.85
5) 0.0070097
6) 0.000000025698
7) 0.7002
8) 0.0222
9) 854300000
10) 0.00000821127
11) 90900000
12) 0.000743
13) 0.6078
14) 4.044
15) 0.00802
16) 0.0000186087
17) 0.0449
18) 777000
19) 9046
20) 0.0000000582
21) 0.0000000277
22) 9821000000
23) 8843200
24) 30976700000

## Answers

1) $3.67 \times 10^{-3}$
2) $4.6 \times 10^{4}$
3) $6.078 \times 10^{-1}$
4) $4.044 \times 10^{0}$
5) $1.665 \times 10^{6}$
6) $9.85 \times 10^{0}$
7) $7.0097 \times 10^{-3}$
8) $2.5698 \times 10^{-8}$
9) $7.002 \times 10^{-1}$
10) $8.02 \times 10^{-3}$
11) $1.86087 \times 10^{-5}$
12) $4.49 \times 10^{-2}$
13) $7.77 \times 10^{5}$
14) $9.046 \times 10^{3}$
15) $2.22 \times 10^{-2}$
16) $5.82 \times 10^{-8}$
17) $8.543 \times 10^{8}$
18) $8.21127 \times 10^{-6}$
19) $9.09 \times 10^{7}$
20) $7.43 \times 10^{-4}$
21) $2.77 \times 10^{-8}$
22) $9.821 \times 10^{9}$
23) $8.8432 \times 10^{6}$
24) $3.09767 \times 10^{10}$
$R \quad E \quad A \quad P$

$1.1 \times 10^{-2} \quad 1.1 \times 10^{4}$
$11 \times 10$
$110 \div 10000$
$110 \times 100$
$110 \div 100$
$1.1 \times 10^{2}$
$1.1 \times 10^{0}$
```
H O M E W O R K
```

The mass of a neutron is,
0.000000000000000000000000001674927 kg

Write this in scientific notation.
$H \quad O \quad \mathrm{E}$ W O R K

The mass of a neutron is,
0.000000000000000000000000001674927 kg

Write this in scientific notation.

$$
1.674927 \times 10^{-27} \mathrm{~kg}
$$

$$
H \quad \underset{\substack{M \\ \text { (open-ended) }}}{\mathrm{M}} \quad \mathrm{O} \quad \mathrm{R}
$$

Write the masses of different stars in scientific notation.

