Name: _____   Date: _____

Learning Goal 2.4	I can convert numbers between standard form and scientific notation.

Many of the measurements scientists use are extremely big or extremely small. For example:

- Mass of Neutron

$0.\underset{3}{000}\,\underset{6}{000}\,\underset{9}{000}\,\underset{12}{000}\,\underset{15}{000}\,\underset{18}{000}.\underset{21}{000}\,\underset{24}{000}\,\underset{27}{001}\,674\,927\ kg$

- Distance to the sun

$149\,\underset{11}{480}\,\underset{9}{000}\,\underset{6}{000}\,\underset{3}{000}\ m$

Scientists needed a way of communicating these numbers that is

- faster

- less likely to make mistakes

Scientific Notation
A way to write numbers that are too big or to small to write in decimal form $$M.\ ...\ \times 10^n$$

always 1 number ↗
before the decimal point.

Now,

- Mass of Neutron

$1.674\,927 \times 10^{-27}\ kg$

- Distance to the sun

$1.4948 \times 10^{11}\ m$

Positive Exponent	- represents numbers bigger than 1 - decimal moves to the left
Negative Exponent	- represents numbers smaller than 1 - decimal moves to the right.

Assignment   Handout   Quiz: Next Day!

Example Express the following numbers in scientific notation.

a. 1200 g $= 1.2 \times 10^3$ g

b. 0.00657 m $= 6.57 \times 10^{-3}$ m

c. 5601 L $= 5.601 \times 10^3$ L

d. 14 100 000 km $= 1.41 \times 10^7$ km

e. 0.000 000 698 mg

$= 6.98 \times 10^{-7}$ mg

f. 12 million hours

$= 12 000 000$ hours

$= 1.2 \times 10^7$ hours

g. The speed of light in a vacuum   299 793 458 m/s

$= 2.99793458 \times 10^8$ m/s

h. Number of seconds in a day   86 400 s

$= 8.64 \times 10^4$ s

i. Mean radius of the earth   6378 km

$= 6.378 \times 10^3$ km

j. Radius of an argon atom   0.000 000 000 098 m

$= 9.8 \times 10^{-11}$ m

To undo scientific notation, or write a number given in scientific notation in standard notation

Positive Exponent	• number is bigger than shown • moves the decimal to the right
Negative Exponent	• number is smaller than shown • moves the decimal to the left

Example Write each number in standard notation.

a. 1.23×10^{-4} mg

$= 0.000 123$ mg

b. 7.35×10^{-10} mL

$= 0.000 000 000 735$ mL

c. 7.982×10^6 km

$= 7 982 000$ km

d. 1.6325×10^{10} kg

$= 16 325 000 000$ kg

Assignment   Handout   Quiz: Next Day!