

START - Scientific Notation and Metric System

CONVERTING AND SCIENTIFIC NOTATION

Show work on notebook paper!

- Convert:
- 1) 1000mg → g
 - 2) 1L → mL
 - 3) 160cm → mm
 - 4) 1.4 km → m
 - 5) 80 cm → m
 - 6) 75 mL → L
 - 7) 5.6 m → cm
 - 8) 65 g → mg

Compare using <, >, or =

- 9) 7g ? 698mg
- 10) 1,500 mL ? 1.5 L
- 11) 536 cm ? 53.6 dm
- 12) 3.6 m ? 36cm

Write the abbreviation for each metric unit and tell if it measures mass, length, or volume

- 13) decigram
- 14) milliliter
- 15) meter
- 16) decameter

Write in scientific notation:

- 17) 12
- 18) 0.156000
- 19) 0.0000000853

Write in standard notation:

- 20) 1.98×10^7
- 21) 4.5×10^4
- 22) 2.71×10^{-1}

What is wrong with the following #s?

- 23) 0.54×10^3
- 24) 97×10^{-4}

Why does this not make sense? Look at the number!

- 25) The diameter of a particular atom is 1.3×10^7 cm.

Solve the following word problems:

- 26) In Australia, the people use approximately 2,240,000,000 pounds of bread in a year. Put in scientific notation
- 27) 0.000065 is the wave length of yellow light. Put in scientific notation.
- 28) A proton weighs 1.673×10^{-27} kg, a neutron weighs 1.75×10^{-27} kg, and an electron weighs 9.11×10^{-31} kg. Write the heaviest particle's mass in standard notation.

Show your work here!

Be neat and organized so I can follow what you did and where the work for each question is.

Target: I can perform metric conversions and use scientific notation

Metric Prefixes:

1000	100	10	1	0.1	0.01	0.001
Kilo	Hecto	Deca	Base	Deci	Centi	Milli
mm	cm	m	m	m	m	m

Conversion Rules:

- To convert to a smaller unit, move decimal point to the right (or multiply).
- To convert to a larger unit, move decimal point to the left (or divide).

Convert to new unit:

#1	27500 mg → g
#2	0.15 DL → mL
#3	1.0×10^3
#4	1.0×10^6
#5	1.0×10^9
#6	2.5×10^4
#7	3.8×10^3

Convert into Sci. Not.

#8	541
#9	9.5
#10	0.025

Example: $3 \cdot 54 \times 10^3$

One #	Rest of the #s	Exponent
3	54	3

Exponent: telling how many places to move the decimal, and which way to move it!

K

C

Q

Measurements and Conversions Gone Wrong!



Measurements and Conversions Gone Wrong!



1999

NASA lost a Mars orbiter - \$125 million loss. A calculation was done with *pound-force seconds*, not *Newton seconds*.

Measurements and Conversions Gone Wrong!

1983 – Air Canada plane ran out of fuel in the air. They thought the fuel was weighed in *kilograms*, but it was weighed in *pounds*.



Measurements and Conversions Gone Wrong!



1492 Columbus ended up in Bahama's not Asia. Measured in *Roman miles* not *Nautical miles*.

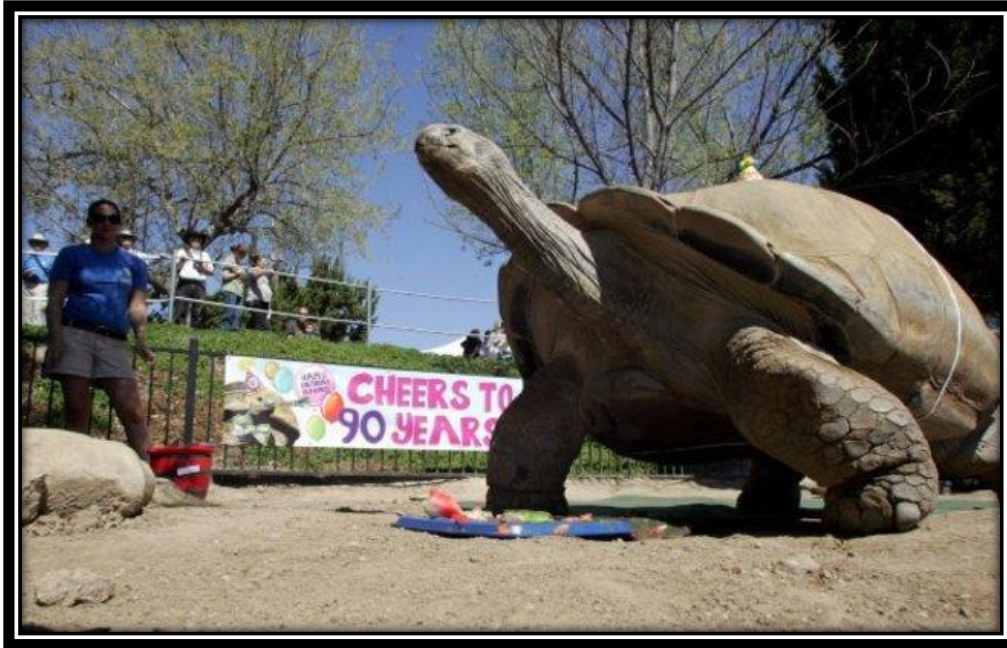
Measurements and Conversions Gone Wrong!

2004

**Tokyo Disneyland's
Space Mountain
Accident. The
building designs
changed from
inches to metric
scale. An axle got
made thinner than it
should have been.**



Measurements and Conversions Gone Wrong!



2001

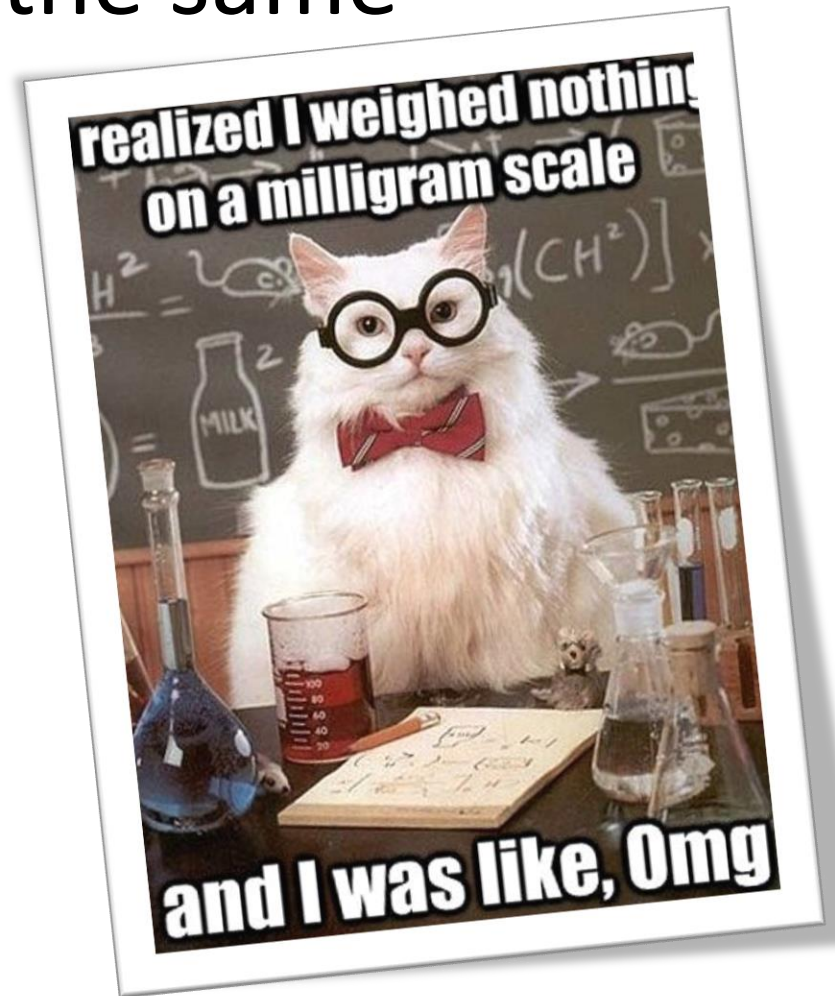
LA Zoo loans
Clarence to
another zoo.

Clarence destroys
the enclosure.

They thought he
was 250lbs but it
was 250 kg! 250kg
is bigger than
250lbs!

Why the Metric System?

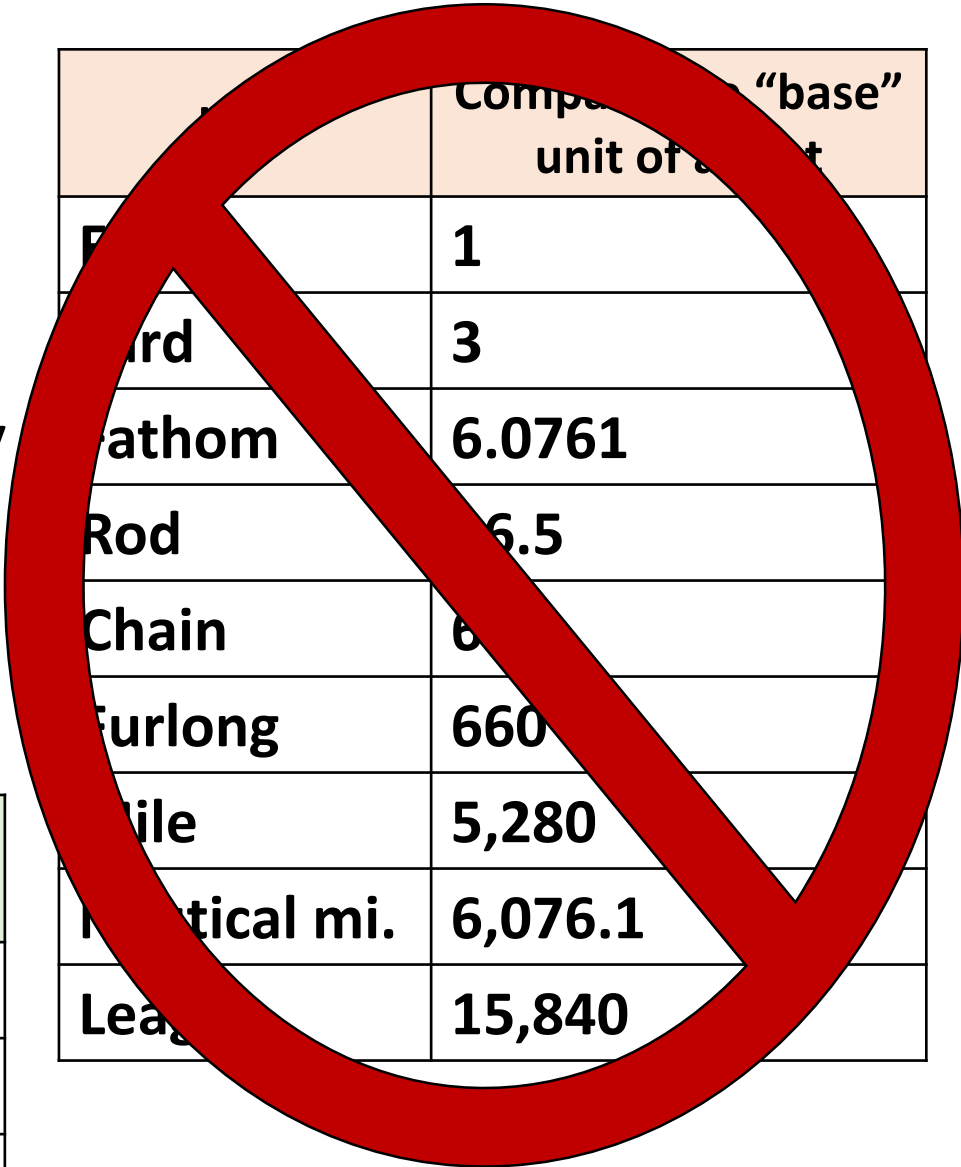
- We all need to speak the same “math language.”
- Everyone else uses it!
- It is easier!



How is it easier?

- Metric system works on “BASE TEN”
- Everything is changed by a factor of 10
- English system is total random!

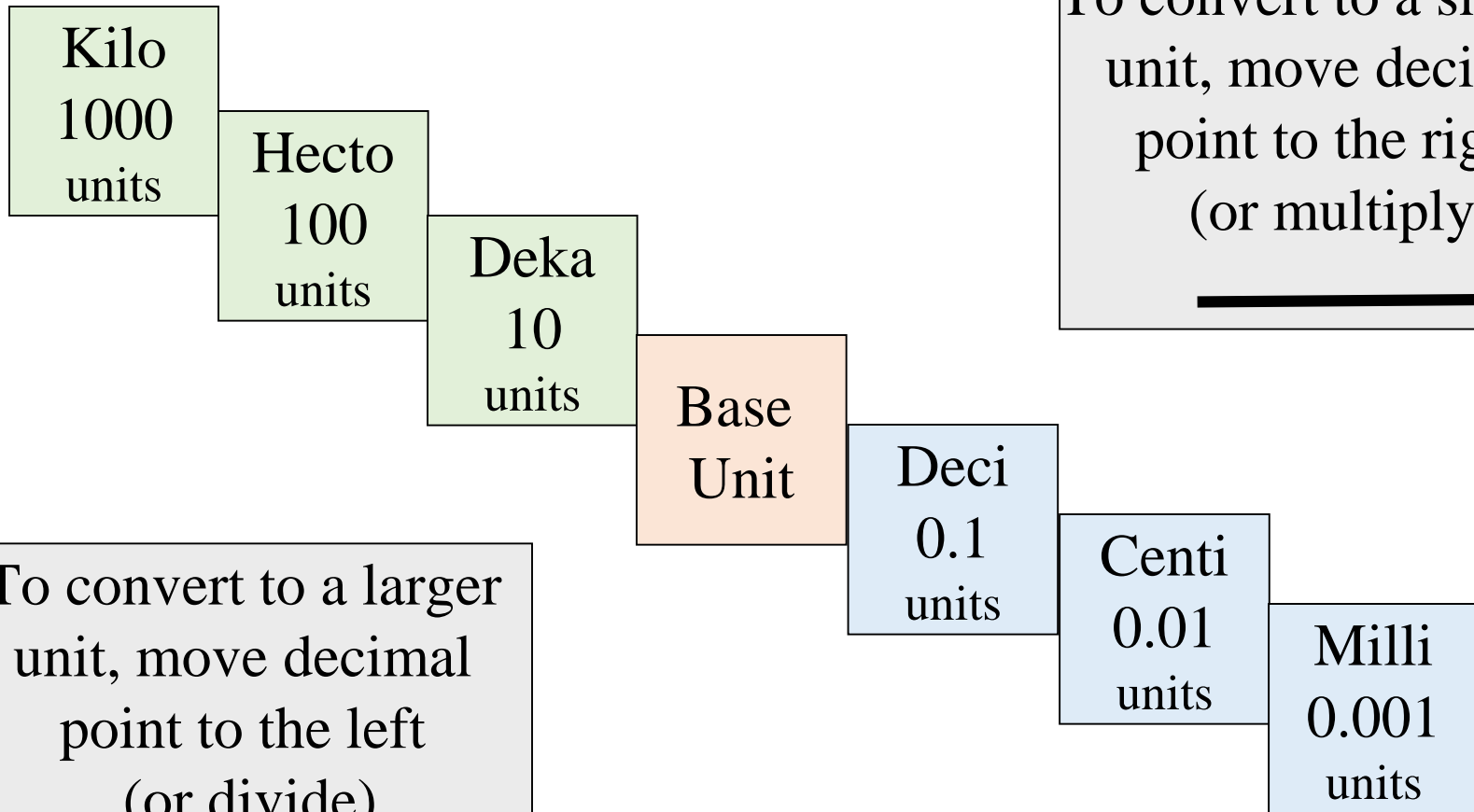
Unit	Compared to “base” unit of a meter
Meter	1
Decameter	10
Hectometer	100
Kilometer	1000



Unit	Compared to “base” unit of a meter
Foot	1
Yard	3
Fathom	6.0761
Rod	16.5
Chain	66
Furlong	660
Statute mile	5,280
Nautical mi.	6,076.1
League	15,840

Converting Metric System

- Just move the decimal!



To convert to a smaller unit, move decimal point to the right (or multiply)

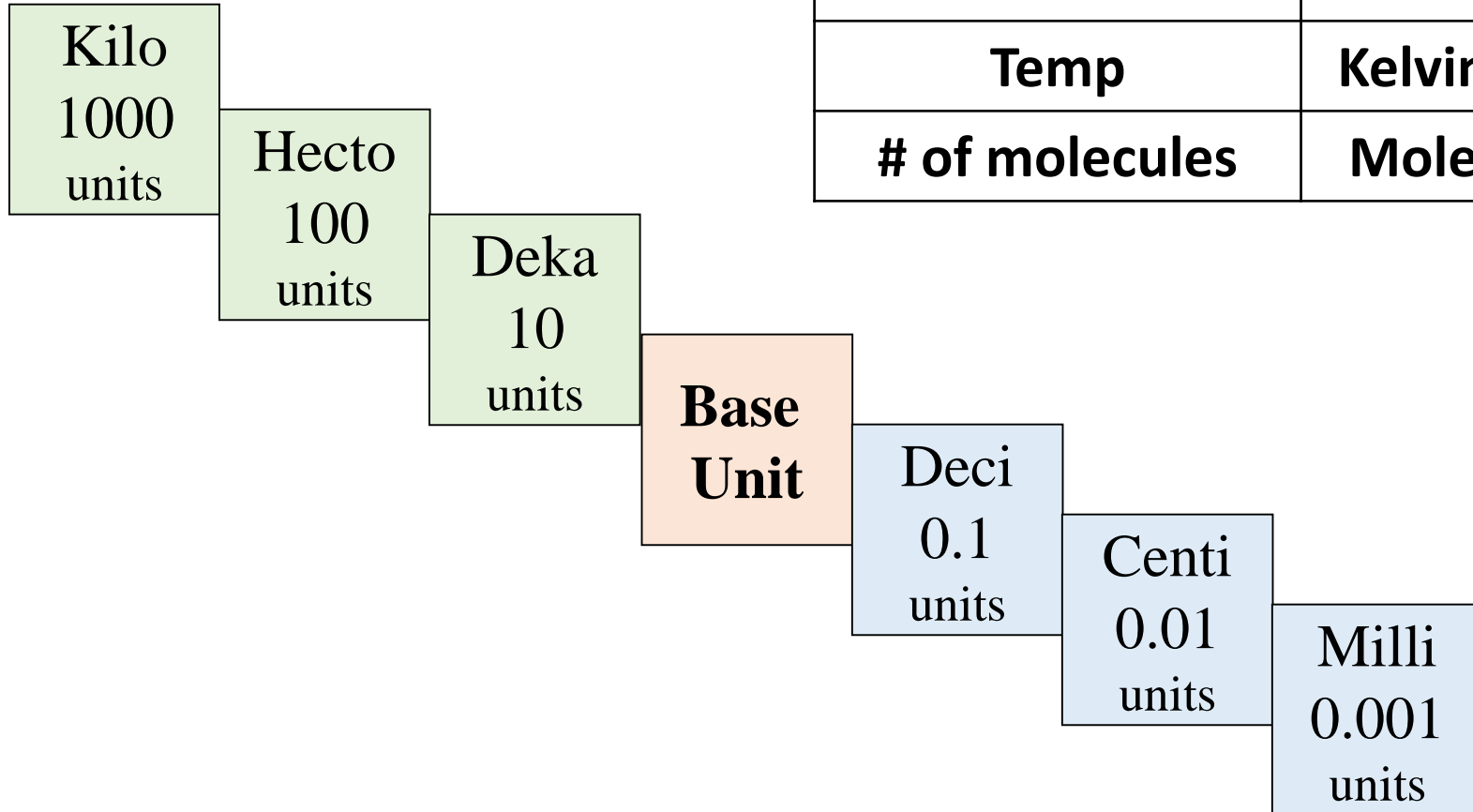


To convert to a larger unit, move decimal point to the left (or divide)



What are the “Base Units?”

Measuring	Unit
Length	Meter
Volume	Liter
Mass	Gram
Time	Second
Temp	Kelvin
# of molecules	Mole



How do I remember the prefixes?

King **H**enry **D**ied **B**y **D**rinking **C**hocolate **M**ilk

K	H	D	B	D	C	M
I	E	E	a	E	E	I
L	C	K	s	C	N	L
O	T	A	e	I	T	L
	O				I	I



Guided Practice

27500 mg \rightarrow g

STEP 1

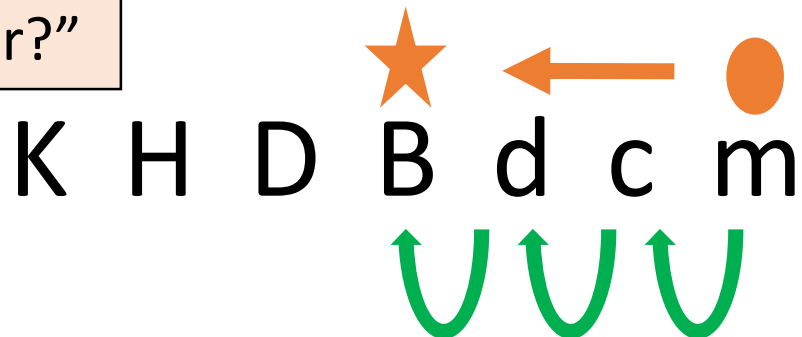
Are you going up or down the "ladder?"

STEP 2

How many steps to get there?

STEP 3

Move decimal that many times, in that direction



2 7 5 0 0 .

The diagram shows the number 27500. with blue U-shaped arrows pointing up from the decimal point to the 5, then to the 7, and finally to the 2.

27.500 g

Guided Practice

$$0.15 \text{ DL} = \underline{\hspace{2cm}} \text{ mL}$$

STEP 1

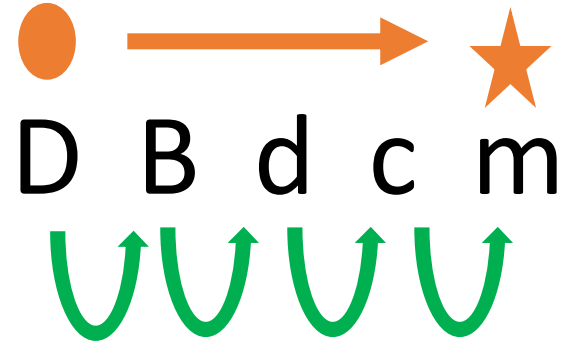
Are you going up or down the “ladder?”

STEP 2

How many steps to get there?

STEP 3

Move decimal that many times, in that direction



0.1500

Four blue U-shaped arrows point to the right, starting from the decimal point and moving it past the 1, 5, and the first 0.

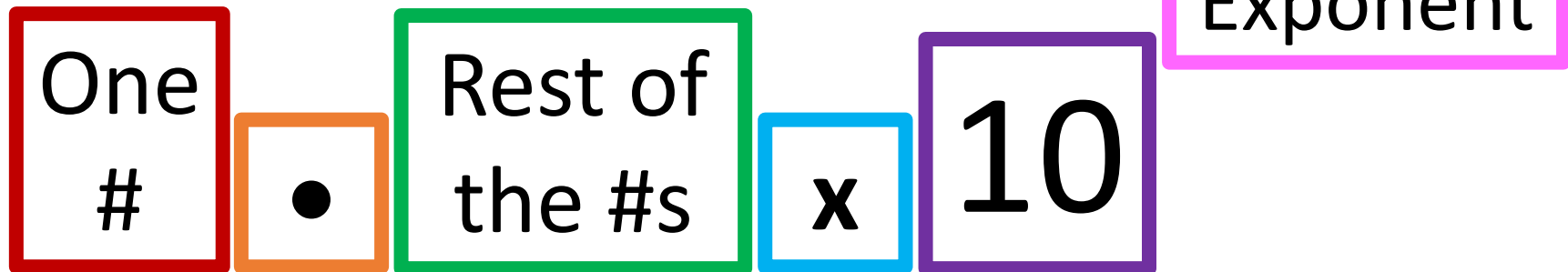
1500 mL

Tired of really big or really small numbers???

- Use scientific notation!
- Move your decimal and rewrite it in “scientific notation format”

$$3 \bullet 54 \times 10^2$$

(tells us how many times to move the decimal, and which way to move it!)



Big or small?

$\times 10^{\text{positive \#}}$	“Big” #	Multiplying by 10’s
$\times 10^{\text{negative \#}}$	“Small” #	Dividing by 10’s

Guided Practice

1.0×10^1	10	2.5×10^4	25000
1.0×10^0	1	3.8×10^{-2}	0.038
1.0×10^{-1}	0.1		

Guided Practice

541	5.41×10^2
9.5	9.5×10^0
0.025	2.5×10^{-2}