WKS
Dimensional Analysis 2   NAME __Answer Key_____
                                                 Period _____ Date _____

VIII. Metric Conversions

Use the prefix conversions chart on the Metric Conversions Video Notes WS to convert the measurements in parts A and B as indicated. You may use either the dimensional analysis method or the new method or a combination of both. **Show all steps** needed to convert from starting units to ending units. You must use the proper number of sig figs in your answer. You can use scientific notation for very large or small numbers. Remember, conversion factors do not limit your sig figs.

Dimensional analysis method shown here. New method on next page.

A. Metric System... Prefix to Base & vice-versa

1) 40. mL to L

$$? \text{ L} = 40.\ \text{mL} \times \frac{1 \times 10^{-3}\ \text{L}}{1\ \text{mL}} = \boxed{0.040\ \text{L}}$$

2) 85 g to µg

$$? \text{ µg} = 85\ \text{g} \times \frac{1\ \text{µg}}{1 \times 10^{-6}\ \text{g}} = \boxed{8.5 \times 10^{7}\ \text{µg}}$$

3) 6300 m to km

$$? \text{ km} = 6300\ \text{m} \times \frac{1\ \text{km}}{1 \times 10^{3}\ \text{m}} = \boxed{6.3\ \text{km}}$$

4) 2.50 kg to g

$$? \text{ g} = 2.50\ \text{kg} \times \frac{1 \times 10^{3}\ \text{g}}{1\ \text{kg}} = \boxed{2.50 \times 10^{3}\ \text{g}}$$

5) 18,600 g to kg

$$? \text{ kg} = 18,600\ \text{g} \times \frac{1\ \text{kg}}{1 \times 10^{3}\ \text{g}} = \boxed{18.6\ \text{kg}}$$

6) 544 ns to s

$$? \text{ s} = 544\ \text{ns} \times \frac{1 \times 10^{-9}\ \text{s}}{1\ \text{ns}} = \boxed{5.44 \times 10^{-7}\ \text{s}}$$

7) 1.92 L to mL

$$? \text{ mL} = 1.92\ \text{L} \times \frac{1\ \text{mL}}{1 \times 10^{-3}\ \text{L}} = \boxed{1920\ \text{mL}}$$

8) 425 MJ to J

$$? \text{ J} = 425\ \text{MJ} \times \frac{1 \times 10^{6}\ \text{J}}{1\ \text{MJ}} = \boxed{4.25 \times 10^{8}\ \text{J}}$$

B. Prefix to Prefix conversions

9) 74.0 cm to km

$$? \text{ km} = 74.0\ \text{cm} \times \frac{1 \times 10^{-2}\ \text{m}}{1\ \text{cm}} \times \frac{1\ \text{km}}{1 \times 10^{3}\ \text{m}} = \boxed{7.40 \times 10^{-4}\ \text{km}}$$

10) 4.13×10⁻⁴ MW to µW (W = watts)

$$? \text{ µW} = 4.13 \times 10^{-4}\ \text{MW} \times \frac{1 \times 10^{6}\ \text{W}}{1\ \text{MW}} \times \frac{1\ \text{µW}}{1 \times 10^{-6}\ \text{W}} = \boxed{4.13 \times 10^{8}\ \text{µW}}$$

11) 1.50×10³ TB to GB (B = bytes)

$$? \text{ GB} = 1.50 \times 10^{3}\ \text{TB} \times \frac{1 \times 10^{12}\ \text{B}}{1\ \text{TB}} \times \frac{1\ \text{GB}}{1 \times 10^{9}\ \text{B}} = \boxed{1.50 \times 10^{6}\ \text{GB}}$$

12) 5,872 ns to µs

$$? \text{ µs} = 5,872\ \text{ns} \times \frac{1 \times 10^{-9}\ \text{s}}{1\ \text{ns}} \times \frac{1\ \text{µs}}{1 \times 10^{-6}\ \text{s}} = \boxed{5.872\ \text{µs}}$$

New method shown here.

A. Metric System... Prefix to Base & vice-versa

1) 40. mL to L $(10^{-3}$ to base)
   $40.0 \times \mathbf{10^{-3}}$ L $= 4.00 \times 10^{-2}$ L $= 0.040$ L
   m

2) 85 g to μg (base to 10^{-6})
   $85 \times \mathbf{(10^6 \times 10^{-6})}$ g $= 8.5 \times 10^7$ **μg**
   μ

3) 6300 m to km (base to 10^3)
   $6300 \times \mathbf{(10^{-3} \times 10^3)}$ m $= 6300 \times 10^{-3}$ **km** $= 6.3$ km
   k

4) 2.50 kg to g (10^3 to base)
   $2.50 \times \mathbf{10^3}$ g
   k

5) 18,600 g to kg (base to 10^3)
   $18{,}600 \times \mathbf{(10^{-3} \times 10^3)}$ g $= 18{,}600 \times 10^{-3}$ **kg** $= 18.6$
   k   kg

6) 544 ns to s $(10^{-9}$ to base)
   $544 \times \mathbf{10^{-9}}$ s $= 5.44 \times 10^{-7}$ s
   n

7) 1.92 L to mL (base to 10^{-3})
   $1.92 \times \mathbf{(10^3 \times 10^{-3})}$ L $= 1.92 \times 10^3$ **mL**
   m

8) 425 MJ to J (10^6 to base)
   $425 \times \mathbf{10^6}$ J $= 4.25 \times 10^8$ J
   M

B. Prefix to Prefix conversions

9) 74.0 cm to km $(10^{-2}$ to $10^3)$
   $74.0 \times \mathbf{10^{-2}}$ m $= 74.0 \times 10^{-2} \times \mathbf{(10^{-3} \times 10^3)}$ m $= 74.0 \times 10^{-5}$ **km** $= 7.40 \times 10^{-4}$ km
   c   k

10) 4.13×10^{-4} MW to μW (W = watts, the SI unit of power) (10^6 to 10^{-6})
    $4.13 \times 10^{-4} \times \mathbf{10^6}$ W $= 4.13 \times 10^{-4} \times 10^6 \times \mathbf{(10^6 \times 10^{-6})}$ W $= 4.13 \times 10^8$ **μW**
    M   μ

11) 1.50×10^3 TB to GB (B = bytes, a unit of computer memory) (10^{12} to 10^9)
    $1.50 \times 10^3 \times \mathbf{10^{12}}$ B $= 1.50 \times 10^3 \times 10^{12} \times \mathbf{(10^{-9} \times 10^9)}$ B $= 1.50 \times 10^6$ **GB**
    T   G

12) 5,872 ns to μs $(10^{-9}$ to $10^{-6})$
    $5{,}872 \times \mathbf{10^{-9}}$ s $= 5{,}872 \times 10^{-9} \times \mathbf{(10^6 \times 10^{-6})} = 5{,}872 \times 10^{-3}$ **μs** $= 5.872$ μs
    n   μ