Name **KEY**
Period___ Date ___/___/___

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TIME PROBLEMS & DIMENSIONAL ANALYSIS

As chemistry students, you have two goals with problems. First, get the correct answer. Second, be able to show others WHY your answer is correct. Dimensional analysis meets both of these goals.
Dimensional analysis is always a **Given** value and one or more **conversion factors** that allow you to determine the **Desired** value.

Any mathematical fact can serve as a conversion factor. 1 hour = 60 minutes ≈ $\dfrac{1\ hour}{60\ min}$ or $\dfrac{60\ min}{1\ hour}$

Ex. Convert 1.25 years into seconds.

$1.25\ yr \times \dfrac{365\ days}{1.0\ yr} \times \dfrac{24\ hr}{1\ day} \times \dfrac{60\ min}{1\ hr} \times \dfrac{60\ sec}{1\ min} = \boxed{39,420,000\ sec}$

1. Convert 2.83 days into seconds.

$2.83\ days \times \dfrac{24\ hr}{1\ day} \times \dfrac{3600\ sec}{1\ hr} = \boxed{244,512\ sec}$

2. Convert 7.72 years into days.

$7.72\ yr \times \dfrac{365.25\ days}{1\ yr} = \boxed{2819.73\ days}$

3. Convert 0.0035 weeks into seconds.

$0.0035\ weeks \times \dfrac{7\ days}{1\ week} \times \dfrac{24\ hr}{1\ day} \times \dfrac{3600\ sec}{1\ hr} = \boxed{2116.8\ sec}$

4. Convert 180 days into minutes.

$180\ days \times \dfrac{24\ hr}{1\ day} \times \dfrac{60\ min}{1\ hr} = \boxed{259,200\ min}$

5. Convert your age into seconds

$*\ 16\ yrs \times \dfrac{365.25\ days}{1\ yr} \times \dfrac{24\ hr}{1\ day} \times \dfrac{3600\ sec}{1\ hr} = \boxed{504,921,600\ sec}$

$*$ Sample age

Density is often used as a conversion factor between the mass and volume of a sample. For example, the density of liquid mercury is 13.6 g/mL.

6. What is the volume of a 175 gram sample of mercury?

$175\ g\ Hg \times \dfrac{1\ mL}{13.6\ g} = \boxed{12.9\ mL}$

7. What is the mass of 1.00 gallon of mercury? [1 cup = 236.588 mL]

$1.00\ gal \times \dfrac{4\ qt}{1\ gal} \times \dfrac{4\ cup}{1\ qt} \times \dfrac{236.588\ mL}{1\ cup} \times \dfrac{13.6\ g\ Hg}{1\ mL} = \boxed{\begin{array}{c} 51,481.5\ g\ Hg \\ or \\ 51.5\ kg\ Hg \end{array}}$

8. When I carry in a 5-gallon container of water from my car, I always wonder its weight. I looked up on the web and found that 1 lb = 0.453542 kg and 1 qt = .946353 Liter. Calculate its weight in pounds.

$5.00\ gal \times \dfrac{4\ qt}{1\ gal} \times \dfrac{.946353\ L}{1\ qt} \times \dfrac{1000\ mL}{1\ L} \times \dfrac{1\ g\ H_2O}{1\ mL} \times \dfrac{1\ kg}{1000\ g} \times \dfrac{1\ lb}{0.453542\ kg} = \boxed{41.7\ lb}$