Key - Day 3 Notes

Dimensional Analysis Class Examples

Use Dimensional Analysis to solve the following problems

Class Examples:

A. How many seconds are in a day?

$$\frac{1\ \text{day}}{1} \cdot \frac{24\ \text{hr}}{1\ \text{day}} \cdot \frac{60\ \text{min}}{1\ \text{hr}} \cdot \frac{60\ \text{sec}}{1\ \text{min}} = \frac{(24)(60)(60)\ \text{sec}}{1} = \boxed{86{,}400\ \text{sec}}$$

B. How many hours are in a year?

$$\frac{1\ \text{year}}{1} \cdot \frac{365\ \text{days}}{1\ \text{year}} \cdot \frac{24\ \text{hr}}{1\ \text{day}} = \frac{(365)(24)\ \text{hr}}{1} = \boxed{8760\ \text{hr}}$$

C. How much bleach (fluid ounces) would you need to make a quart of 5% bleach solution?

$$\frac{.05\ \text{qt}}{1} \cdot \frac{2\ \text{pint}}{1\ \text{qt}} \cdot \frac{2\ \text{cups}}{1\ \text{pint}} \cdot \frac{8\ \text{ounces}}{1\ \text{cup}} = \boxed{8.8\ \text{ounces}}$$

D. Your car tank holds 18.6 gallons and is one-quarter full. Your car only gets 16 miles/gallon. You see a sign that says "Next gas 70 miles". Your often-wrong brother, who is driving, thinks that you will make it without running out of gas. Is he right?

$(18.6\ \text{gal})(\frac{1}{4}) = 4.65\ \text{gallons in tank}$

$$\frac{4.65\ \text{gal}}{1} \cdot \frac{16\ \text{mi}}{1\ \text{gal}} = \boxed{74.4\ \text{mi}}$$

Yes, he is right. they will still have 4.4 mi to drive

E. If you are going 50 miles/hour, how many feet per second are you traveling?

$$\frac{50\ \text{mi}}{1\ \text{hr}} \cdot \frac{5280\ \text{ft}}{1\ \text{mi}} \cdot \frac{1\ \text{hr}}{60\ \text{min}} \cdot \frac{1\ \text{min}}{60\ \text{sec}} = \frac{(50)(5280)\ \text{ft}}{(60)(60)\ \text{sec}} = \frac{264{,}000\ \text{ft}}{3600\ \text{sec}}$$

$$= \boxed{73.33\ \text{ft/sec}}$$