

**Dimensional Analysis problems:** Solve these problems using dimensional analysis and using conversion factors. I am sure you can solve them some other ways but stick to the format taught either last year or in the webpage above.

1) How many miles could you drive for \$7.90 if the gas mileage of your car is 14.0 km/liter of gas and the price is \$2.64/gal? (1.61 km/mile, 4 qt/gal, 1.10 qt/L) (ans: 94.6 miles)

2) Mark McGuire hit 70 home runs in the 1998 season. Given that there are 4 bases with 90 feet between each base, how many miles did he run last season just from home runs? (1 mile = 5280 ft) (ans: 4.77 miles)

3) David Hill operates a crane that can pick up 3.0 tons of excavated earth in an hour. Dave's wages are \$35 per hour. What, then, is the cost of picking up 85 kg of excavated earth? (2.2 lb/kg, 2000 lb/ton) (ans: 1.1 dollars)

4) If one afternoon Jack Trafton decides to dig a hole through the earth to China for a game of ping pong, how many centuries would elapse before he got there if he dug at a rate of 0.400 miles depth per day and the diameter of the earth is  $1.2700 \times 10^7$  m? (1.61 km/mile) (ans: 0.54 centuries)

5) One 1.6 oz. of package of cinnamon and spice instant oatmeal contains 34 g of carbohydrates. If you had instant oatmeal 6.0 days a week, how many ounces of carbohydrate would you consume in a week? (16 oz = 1 lb = 454 grams) (ans: 7.2 oz of carbohydrate)

6) Vanillin (used to flavor vanilla ice cream and other foods) is the substance whose aroma the human nose detects in the smallest amount. The threshold limit is  $2.0 \times 10^{-11}$  g per liter of air. If the current price of 50 g of vanillin is \$112, determine the cost to supply enough vanillin so that the aroma could be detected in a large aircraft hangar with a volume of  $5.0 \times 10^7$  ft<sup>3</sup>. Hint: look up how many liters there are in a cubic foot. (ans = 6.3 cents)