

### Dimensional Analysis Worksheet

Answer these questions on a separate sheet of paper. Remember to show ALL work, circle your final answer and show units.

1. Using a conversion table, convert 17.5 quarts to
  - a. liters
  - b. cubic meters
  - c. cubic feet
2. Convert  $38.75 \text{ ft}^2$  to
  - a. square miles
  - b.  $\text{km}^2$
  - c.  $\text{m}^2$
3. The unit of measure in the metric system is the hectare; in the English system it is the acre. A square of exactly 100 meters on a side has an area of one hectare; if it is 208.7 feet on a side, the area is one acre. How many acres are in one hectare?
4. In the U.S., cigarettes are smoked at a rate of  $2.0 \times 10^4$  cigarettes/second. At this rate, how many are smoked in one day? If you assume the population of the U.S. is 300 million, how many cigarettes are smoked per day per person, on average?
5. A day on Mars is  $8.864 \times 10^4$  seconds long and a year is  $5.935 \times 10^7$  seconds long.
  - a. How many earth days are there in one Mars day?
  - b. How many earth days are there in one Mars year?
6. A typical aerobic walker on a track covers a lap (0.25 miles) in about 3.4 minutes. A champion marathon runner takes about five minutes to cover a mile. If an aerobic walker completed the Boston Marathon (42.16 km), how many minutes would you expect him to fall behind the winner?
7. During earlier times in England, land was measured in units such as fardells, nookes, yards, and kides:  
2 fardells = 1 nooke; 4 nookes = 1 yard; 4 yards = 1 kide  
Thus,
  - a. 6.00 kides = \_\_\_\_\_ fardells
  - b. 15 nookes = \_\_\_\_\_ kides
  - c. 15 nookes = \_\_\_\_\_ fardells
  - d. Which is longer, a fardell or a kide? How do you know this?
8. In 1618, the Pharmacopoeia of London used the troy system of measure to prepare medicine. Among the units used were:  
20 grains = 1 scruple; 3 scruples = 1 drachm; 8 drachms = 1 ounce; 12 ounces = 1 pound.  
Thus,
  - a. 12.05 pounds = \_\_\_\_\_ drachms
  - b. 25.0 drachms = \_\_\_\_\_ pounds
  - c. 25.0 drachms = \_\_\_\_\_ ounces
9. In Germany, nutritional information is given in kilojoules instead of nutritional calories (1 nutritional calorie = 1 kcal). A packet of Rindfleisch-Suppe (meat soup) has the following information:  
250 mL of prepared soup = 235 kJ  
A packet of the same soup sold in the U.S. would have the same nutritional information in kilocalories per cup. There are two cups in a pint. How many nutritional calories would be quoted per cup of prepared soup?