

DIMENSIONAL ANALYSIS PRACTICE

***** many problems in both everyday life and in science involve converting measurements**

***** dimensional analysis is also known as the “factor-label method” or “unit conversion”**

--- Dimensional Analysis makes use of ratios called CONVERSION FACTORS

--- a CONVERSION FACTOR is a RATIO of two quantities EQUAL to EACH OTHER(for example... 1 foot= 12 inches)

--- the CONVERSION FACTOR COULD BE EXPRESSED AS:

$$\frac{\underline{1 \text{ FOOT}}}{12 \text{ INCHES}} \quad \text{or as,} \quad \frac{\underline{12 \text{ INCHES}}}{1 \text{ FOOT}}$$

--- you must multiply the GIVEN UNIT by a CONVERSION FACTOR which is expressed in the form which allows you to CANCEL OUT the GIVEN UNIT and KEEP the REQUESTED UNIT

--- HOW DO YOU GET THE VALUES FOR THE CONVERSION FACTOR? 1) BY MEMORY; 2) YOU LOOK IT UP; 3) IT IS GIVEN TO YOU IN THE PROBLEM; or 4) YOU USE AN INTERMEDIATE or a SERIES OF INTERMEDIATES

EXAMPLE: 12 days = ? minutes

EXAMPLE: 1256 cm = ? km

Problems Sets:

Use the following quantities for questions 1-3:

60s = 1 min	5.50 yd = 1 rod
12in = 1 ft	7 days = 1 wk
60 min = 1 hr	5280 ft = 1 mi
3 ft = 1 yd	365 days = 1 yr
24h = 1 day	

1. Write the conversion factor needed for each unit conversion:

- | | |
|------------------|-----------------------|
| a) feet to yards | b) years to days |
| c) yards to rods | d) days to hours |
| e) feet to miles | f) seconds to minutes |

2. Solve each problem by dimensional analysis on a separate sheet:

- How many feet long is the 440 yard dash?
- Calculate the number of minutes in two weeks.
- Calculate the number of days in 1800 hours.
- How many miles is 660 ft?
- How many inches long is a 100 yd football field?
- Calculate the number of hours in one year.
- How many rods are there in 12 miles?
- Calculate the number of minutes in 7 days.

3. Solve each problem by dimensional analysis:

- A student walks at a brisk 3.50 mi/hr. Calculate the student's speed in yards/minute.
- Water runs through a hose at the rate of 2.5 gal/min. What is the rate of water flow in gallons/day?
- A clock gains 2.60 s each hour(2.6 s gained/hr). What is the rate of time gained in minutes/week?
- A spider travels 115 inches in 1 min(speed = 115 in/min) What is the speed of the spider in miles/hour?

4. Using your knowledge of metric prefixes, perform the following conversions using dimensional analysis:

- 45 meters to kilometers
- 865 cm³ to liters
- 0.23 km to decimeters
- 8.5 dm to millimeters
- 57.78 L to mL