Multiple-Step Dimensional Analysis Practice (Introductory Chemistry Podcasts 4 and 5)

Multiple-step dimensional analysis problems are solved in the same manner as one-step dimensional analysis problems. So, if you could do the one-step, you can do any dimensional analysis problem! All you have to do is set-up the problem so that your units continuously cancel out until you are left with the unit you want at the end. Please view **Introductory Chemistry Podcast 4 and 5**: on Dimensional Analysis for a refresher on how to solve these problems. Many of the problems can be solved more than one way. At minimum, choose five problems from page 1, five problems from page 2 and two problems from page 3 (total = 12 problems minimum). I strongly encourage you to attempt all problems.

Directions: Solve the following dimensional analysis problems. Show all work.

1. How many inches are there in a football field (100 yards)? 1 yard = 3 feet; 1 foot = 12 inches

2. How many walking paces are there approximately as you walk down Main Street (0.25 miles)?
   1 mile = 5280 feet; 1 foot = 12 inches; 22 inches = 1 walking pace

3. How many feet are between the first and second story of a building (1 story)?
   1 story = 3.33 meters; 100 centimeters = 1 meter; 1 inch = 2.54 cm; 1 foot = 12 inches

4. How many hours are in a fortnight (2 weeks)?
   1 week = 7 days; 1 day = 24 hours

5. How many decades are equal to 1.7×10^{25} minutes?
   60 min = 1 hour 24 hours = 1 day 7 days = 1 week 52 weeks = 1 year 10 years = 1 decade

6. On average, there are 3 pages in every chapter of a James Patterson novel. Each book has approximately 79 chapters. James Patterson has published 58 books. Approximately how many pages has James Patterson written?

7. Houston has approximately 2,210,000 million people. Each person has 2 hands and each hand has 5 fingers. How many fingers are in Houston? Answer in scientific notation.

8. There are 2850.5 miles between Houston, TX and Vancouver, Canada, site of the 2010 Olympic Games. How many **meters** is that equal to if 1 mile is equal to 1.6 km? Express your answer in scientific notation

9. A newborn baby eats 8 times a day. At each feeding, he eats 2.5 ounces of formula. How many days would it take for the baby to eat 1000 ounces?

10. Jonathan raised 60 goats, then entered into a series of business transactions. He traded all the goats for sheep at an exchange rate of 5 goats for 7 sheep. Next, he exchanged all the sheep for hogs at a rate of 4 sheep for 2 hogs. How many hogs did he get?

11. Eggs are shipped from a poultry farm in trucks. Each carton of eggs holds 12 eggs. The cartons of eggs are then placed in a crate that holds 20 cartons. The cartons are packed in trucks that carry 3125 crates of eggs. How many truckloads will it take to carry 3.75×10^6 eggs?

12. A chemistry teacher spends 5 minutes grading 1 student's lab. She has 150 students who turn in lab papers for each lab. If we do 25 labs in class, how many minutes will I spend grading lab papers?

13. My son drinks 3 cups of milk a day. There are 8 ounces in a cup. How many ounces would he have drunk after 10 weeks?

14. In the average US household, the television is on 6.75 hours a day! How many hours will have passed after 77.7 years (the average life expectancy of an American)?

15. Each dimensional analysis problem has taken you 1.5 minutes to complete. How many dimensional analysis problems could you complete in 6 weeks of chemistry class (242 minutes a week)?

16. 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 in this season just from home runs?

17. Because you never learned dimensional analysis, you have been working at a fast food restaurant for the past 35 years wrapping hamburgers. Each hour you wrap 184 hamburgers. You work 8 hours per day. You work 5 days a week. You get paid every 2 weeks with a salary of $840.34. How many hamburgers will you have to wrap to make your first one million dollars?

18. If Gasp cigarettes have 5 mg tar and 0.4 mg nicotine per cigarette and there are 20 cigarettes per pack, how many packs of cigarettes would have to be smoked to coat your lungs with 4 oz (1/4 lb.) of tar? How many packs would you have to smoke to introduce your lungs to one gram of the drug nicotine?

19. At one time Rigel IV, a class M planet had a system of weights and measures called the Bozo system. This system was created and used by the Bozonians, who lived on a continent in the Northern hemisphere, and had all of the deficiencies of the current English system on earth. The relationships between the various units used for length in the Bozo system are given below:

* 325 cubebs = 1 furbish
* 6 furbishes = 1 nautical smile
* 20 nautical smile = 1 minor league
* 3 minor leagues = 1 major league

Using the above conversion factors determine the number of cubebs a Bozonian would have to walk if his doctor recommended that he walk 2 major leagues each day to maintain cardiovascular health.

20. Rigel IV is 10.8 light-years from Earth. How far is that in miles?