Key

Multiple-Step Dimensional Analysis

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.

Directions: Solve the following dimensional analysis problems. Show all work in your set-up to get full credit.

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

   3,600 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

   720 paces

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

   10.9 feet

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

   336 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

   $\frac{1.7 \cdot 10^{25}\ \text{min}}{1} \cdot \frac{1\ \text{hour}}{60\ \text{min}} \cdot \frac{1\ \text{day}}{24\ \text{hours}} \cdot \frac{1\ \text{week}}{7\ \text{days}} \cdot \frac{1\ \text{year}}{52\ \text{weeks}} \cdot \frac{1\ \text{decade}}{10\ \text{years}} = 3.24 \cdot 10^{17}\ \text{decades}$

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?

   $\frac{3\ \text{pages}}{1\ \text{chapter}} \cdot \frac{79\ \text{chapters}}{1\ \text{book}} \cdot \frac{58\ \text{books}}{} = 13,746\ \text{pages}$

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.

   22,100,000 fingers

   $2.21 \cdot 10^{7}$

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.

$4.5608 \cdot 10^6$ meters

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?

$$\frac{1{,}000 \text{ ounces}}{2.5 \text{ ounces}} \left| \frac{1 \text{ Feeding}}{8 \text{ Feedings}} \right. = 50 \text{ days}$$

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?

$$\frac{60 \text{ goats}}{5 \text{ goats}} \left| \frac{7 \text{ sheep}}{4 \text{ sheep}} \right| \frac{2 \text{ hogs}}{} = 42 \text{ hogs}$$

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?

$$\frac{3125 \text{ crates}}{1 \text{ truck}} \left| \frac{20 \text{ cartons}}{1 \text{ crate}} \right| \frac{12 \text{ eggs}}{1 \text{ carton}} \left| \frac{x \text{ of trucks}}{3.75 \cdot 10^6 \text{ eggs}} \right. = 5 \text{ trucks}$$

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?

18,750 minutes

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?

$$\frac{3 \text{ cups}}{1 \text{ day}} \left| \frac{7 \text{ days}}{1 \text{ week}} \right| \frac{8 \text{ ounces}}{1 \text{ cup}} \left| \frac{10 \text{ weeks}}{} \right. = 1{,}680 \text{ ounces}$$

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)?

$1.91 \cdot 10^5$ hours

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)?

968 problems