Math 107 – Homework #2 – Units part 2

USCS–Metric Conversions. Convert the following quantities to the indicated units. Where necessary, round to the nearest hundredth.

1. 22 kilograms to pounds
2. 160 centimeters to inches
3. 16 quarts to liters
4. 2 square kilometers to square miles
5. 55 miles per hour to kilometers per hour
6. 23 meters per second to miles per hour
7. 300 cubic inches to cubic centimeters
8. 18 grams per cubic centimeter to pounds per cubic inch

FURTHER APPLICATIONS

9. **Professional Baseball Salaries.** In the 2016 season, Kenley Jansen of the Los Angeles Dodgers earned $10.65 million. Mr. Jansen is a relief pitcher meaning he usually pitches only the 8^{th} or 9^{th} inning and is not used every game.

   a. Mr. Jansen pitched in 71 regular season games and 7 games in the playoffs. How much did Jansen earn per game played?

   b. Mr. Jansen pitched a grand total of 80.1 innings during the season and playoffs, how much did he earn per inning?

   c. Mr. Jansen is a specialist in striking out batters. Over the course of the last season (regular and playoffs) he struck out 123 batters. How much did he earn per strikeout?

10. **Busy Reading.** Suppose you have a tablet with a capacity of 16 gigabytes. For a plain text book, one byte typically corresponds to one character and an average page consists of 2000 characters. Assume all 16 gigabytes are used for plain text books.

    a. How many pages of text can the tablet hold?

    b. How many 500-page books can the tablet hold?

Currency Conversions. Use the currency exchange rates in Table below to answer the following questions. State all of the conversion factors that you use.

11. Suppose a new fuel-efficient German car travels an average of 26 kilometers on 1 liter of gasoline. If gasoline costs 1.50 euros per liter, how much will it cost in dollars to drive 300 kilometers?
12. A 0.8-liter bottle of Mexican wine costs 100 pesos. At that price, how much would a half-gallon jug of the same wine cost in dollars?
13. **Power Spa.** An outdoor spa (hot tub) draws 1500 watts to keep the water warm. If the utility company charges $0.10 per kilowatt-hour, how much does it cost to operate the spa for four months during the winter (24 hours per day)?
14. **Coal Power Plant.** A new coal-burning power plant can generate 1.5 gigawatts (billion watts) of power. Burning 1 kilogram of coal yields about 450 kilowatt-hours of energy. How much energy, in kilowatt-hours, can the plant generate each month? How much coal, in kilograms, is needed by this power plant each month? If a typical home uses 1000 kilowatt-hours per month, how many homes can this power plant supply with energy?

Gas Mileage. Answer the following practical gas mileage questions.

15. You plan to take a 2000-mile trip in your car, which averages 32 miles per gallon. How many gallons of gasoline should you expect to use? Would a car that has only half the gas mileage (16 miles per gallon) require twice as much gasoline for the same trip? Explain.

TABLE Sample Currency Exchange Rates

Currency	Dollars per Foreign	Foreign per Dollar
British pound	1.624	0.6158
Canadian dollar	1.005	0.9950
European euro	1.320	0.7576
Japanese yen	0.0120	83.33
Mexican peso	0.07855	12.73

Math 107

Some useful unit conversions

TABLE 2.1 The U.S. Customary System of Measurement (common abbreviations in parentheses)

LENGTHS	1 inch (in) = 2.54 centimeters	1 furlong = 40 rods = $\frac{1}{8}$ mile	
	1 foot (ft) = 12 inches	1 mile (mi) = 1760 yards = 5280 feet	
	1 yard (yd) = 3 feet	1 nautical mile = 1.852 km ≈ 6076.1 feet	
	1 rod = 5.5 yards	1 league (marine) = 3 nautical miles	
	1 fathom = 6 feet		
WEIGHTS	**Avoirdupois**	**Troy**	**Apothecary**
	1 grain = 0.0648 gram	1 grain = 0.0648 gram	1 grain = 0.0648 gram
	1 ounce (oz) = 437.5 grains	1 carat = 0.2 gram = 3.086 grains	1 scruple = 20 grains
	1 pound (lb) = 16 ounces	1 pennyweight = 24 grains	1 dram = 3 scruples
	1 ton = 2000 pounds	1 troy ounce = 480 grains	1 apoth. ounce = 8 drams
	1 long ton = 2240 pounds	1 troy pound = 12 troy ounces	1 apoth. pound = 12 ounces
VOLUMES	**Liquid Measures**		**Dry Measures**
	1 tablespoon (tbsp or T) = 3 teaspoons (tsp or t)		1 in^3 ≈ 16.387 cm^3
	1 fluid ounce (fl oz) = 2 tablespoons = 1.805 in^3		1 ft^3 = 1728 in^3 = 7.48 gallons
	1 cup (c) = 8 fluid ounces		1 yd^3 = 27 ft^3
	1 pint (pt) = 16 fluid ounces = 28.88 in^3		1 dry pint (pt) = 33.60 in^3
	1 quart (qt) = 2 pints = 57.75 in^3		1 dry quart (qt) = 2 dry pints = 67.2 in^3
	1 gallon (gal) = 4 quarts		1 peck = 8 dry quarts
	1 barrel of petroleum = 42 gallons		1 bushel = 4 pecks
	1 barrel of liquid = 31 gallons		1 cord = 128 ft^3

TABLE 2.3 USCS–Metric Conversions

USCS to Metric	Metric to USCS
1 in = 2.540 cm	1 cm = 0.3937 in
1 ft = 0.3048 m	1 m = 3.28 ft
1 yd = 0.9144 m	1 m = 1.094 yd
1 mi = 1.6093 km	1 km = 0.6214 mi
1 lb = 0.4536 kg	1 kg = 2.205 lb
1 fl oz = 29.574 mL	1 mL = 0.03381 fl oz
1 qt = 0.9464 L	1 L = 1.057 qt
1 gal = 3.785 L	1 L = 0.2642 gal