

Midterm 1 - Units and Real World Numbers

Math 1030 - Dylan Zwick's Class

Fall 2007

Name: _____

Conversion Factors

1 year = 365 days
1 day = 24 hours
1 hour = 60 minutes
1 minute = 60 seconds
1 dram = 3 scruples
1 scruple = 20 grains
1 grain = 0.0648 grams
1 kilogram = 2.2046 pounds
1 dollar = 115.367 yen

Constants

Diameter of Carbon Atom = 1×10^{-10} meters
Earth-Sun Distance = 1.49578×10^{11} meters
Mass of Carbon = 12.000 grams per mole.
1 mole = 6.022×10^{23} atoms.

1. Unit Conversions (10 points)

(a) How many minutes are there in two years? (2 points)

(b) How many drams are in a kilogram? (3 points)

(c) How many carbon atoms, laid end to end, would it take to get from the Earth to the Sun? And how much would all these atoms weight? (5 points)

2. Compound Unit Problem (10 points)

- (a) If you have a 100 watt light bulb turned on for 10 hours per day, how much energy (in kilowatt-hours) does this use in a 30 day month? (5 points)
- (b) If electricity is 9 cents per kilowatt-hour, how much does the electricity cost to power the light bulb for that month? (5 points)

3. Currency Conversion Problem (5 points)

You plan to travel to Japan and you are practicing how to deal with different measurement systems. Consider the following situation: Suppose pears at a store in Japan are priced at 950 yen per kilogram. What is the price of these pears in US dollars per pound? (5 points)

4. Percentages (10 points)

- (a) The annual number of deaths from cardiovascular disease in the United States decreased from 1,008,000 in 1970 to 910,600 in 2004. Find the absolute change, and the relative change as a percentage. (4 points)

- (b) A friend paid a total bill of \$21.83 at a restaurant and said she left an 18% tip. What was the original total of the restaurant bill, before the tip? (3 points)

- (c) The federal reserve announces that it is changing interest rates from 4% to 4.25%. By what relative percentage did interest rates increase? (3 points)

Example - A change from 3% to 6% is a 100% relative increase.

5. **Scientific Notation** (10 points)

Perform the following calculations, and express your answers in scientific notation:

(a) $2.5 \times 10^{12} - 1.7 \times 10^{12}$ (2 points)

(b) $(3.1 \times 10^5) * (2.7 \times 10^2)$ (2 points)

(c) $\frac{1.6 \times 10^{-5}}{7.5 \times 10^3}$ (2 points)

(d) $2.42 \times 10^4 + 7.1 \times 10^3$ (2 points)

(e) Express 6, 590, 000, 000 in scientific notation. (2 points)

6. **Uncertainty** (5 points)

- (a) Express the following solutions using the correct number of significant digits.

i. $3.41in + 2.6in$ (2 points)

ii. $\frac{5.47892 \times 10^2}{4.57 \times 10^{-1}}$ (2 points)

- (b) If a scale has its base weight off by 2 lbs, so it weights everybody at 2 lbs greater than their actual weight, is this an example of a random error or a systematic error? (1 point)