

How to do things



As the given quantity. How many significant figures are in the following quantities? Calculations with significant figures: Rounding: If the first digit to be dropped is 4 or less, then it and all following digits are simply dropped from the number. If the first digit to be dropped is 5 or greater, then the last retained digit is increased by 1 (I. E. Round up). 4. 2349 4. 2379 10. 010 10. 016

Multiplication and Division: The final answer in the calculation should have the same number of significant figures as the measurement with the fewest significant figures. Addition and Subtraction: The final answer in the calculation should have the same number of decimal places as the measurement with the fewest decimal places.

Solve each of the following calculations and give an answer with the correct number of decimal places or significant figures. $45.48 \text{ CM} + 8.057 \text{ CM} = 1.008 \text{ L} - 0.58596 \text{ L} - 45.7 \times 0.034 - 0.00278 \times 500 \times 185 - 2.40 / (4 + 125) = (3.64 - 0.070) / 0.00035$

Conversion Factors: Conversion factors are used to change from one unit to another. Density, military, parts per million (pimp), parts per billion (BP), percentages, OLDS values are some examples of conversion factors. $1.00 \text{ inch} = 2.54 \text{ CM}$ is another conversion factor (metric to English and vice versa).

Study Note: You do not need to memorize conversion factors. HOWEVER you should know how to write all the conversion factors listed above. Use the data on Table 1.8 on page 21 and the table on the back of the textbook cover to solve C. F. Problems. A few examples of calculations using conversion factors: 1. A person who weighs 175 pounds is 8% body fat. How many pounds of fat does the person have? 2. The OLDS (or Lethal Dose that

kills 50% of the test population... Which are rats) value is a measure of a substance's toxicity. The lower the value the more toxic the substance.

EVERY chemical has an OLDS value How many MGM of caffeine will kill a 175 pound person if the OLDS of caffeine is 192 MGM/keg? 3. How many liters of olive oil are in 30. 0 g if the density of the oil is 0. 92 g/ml at 25 co? (Density is a C. F. Used to convert mass to volume for a liquid). *Challenge: How many goof gasoline are in 40. 1 gallons? Density: The amount of mass in a given volume for any substance. $D = m/v$ Specific Gravity: A ratio of the density off liquid to the density of water. This is a ENTITLES number. Density and therefore specific gravity vary with temperature.

Liquids become viscous when cooled and thin out when heated. A Hydrometer is used to measure the specific gravity of liquids like beer, urine, inkiest dyes and other substances. The specific gravity of urine can be a quick indicator of certainhealthproblems: Reduced specific gravitydiabetesinsipid certain renal diseases excess fluid intake diabetes mellitus Raised specific gravity dehydration adrenal insufficiency nephritis congestive cardiac-failureliver disease Constant specific gravity chronic renal disorder This brew-master in figure 1. 3 is using a hydrometer to determine the progress of fermentation. Why does ice float? StudyGoalsfor Chapter 1: Write quantities in scientific notation (and vice versa) Identify the amount of significant figures in a measurement Use conversion factors to change units in a quantity Understand the importance of specific gravity readings of urine ENERGY Everything in the universe is either matter or energy Matter: Anything that has mass and occupies space. Solids, liquids, gases, atoms,

and even subatomic particles (protons, neutrons and electrons). Energy: The ability to do work.

Two main categories of energy: Potential Energy: Stored energy such as food, gasoline, wood prior to burning, water at the top of a dam, TAP (the bodies energy source) etc. Kinetic Energy: Energy of motion such as running (burning carbohydrates and fat), driving a car (burning gasoline or hydrogen), water flowing over a dam, a campfire, etc. Electromagnetic Radiation (light energy): Visible light, infrared light, ultraviolet light, microwaves, X-rays are some examples of electromagnetic energy. As matter gets smaller (I. E. Approaching the bottom of the pyramid of life), it starts to behave like energy.

Matter is nothing more than organized energy! Check out the film *What the Bleep Do We Know??* For more on this subject of matter and energy. Heat: Temperature: Units of Energy: The SI unit for energy is the Joule (J), a derived unit. The older and more common unit is the calorie (Cal). 1 calorie = 4.184 J Energy and Nutrition For measuring the amount of energy in food or burned during exercise, the calories (aka food calorie) is used and is abbreviated C. When you read a label on a box of food the amount of energy is in food calories. 1 C = 1,000.

Cal How do we measure the amount of C in food? Burn it in a calorimeter! When food is ignited and burned, the heat warms the water in the surrounding combustion chamber. The energy given off by the food is proportional to the temperature change of the water and can be easily calculated. Please memorize the following conversion factors! You should

leave this class knowing how much energy is in each food type. How many C are in 6.0 oz of ground beef which contains 45.0 Goff protein and 11.0 g of fat? What are the main functions of fats, proteins and carbohydrates in the body?

More on this at the end of the course. Temperature Conversions Table 2.5
Celsius to Kelvin: $-^{\circ}\text{C} + 273$ Celsius to Fahrenheit: $-^{\circ}\text{C} = (\text{TFH} - 32) / 1.8$ No need to memorize these, just know how to use them properly. Normal body temperature is 96.8 - 98.6 OF. Deviations outside of this range begin to impair body functions. Therefore, accurate readings to one decimal place are necessary. Specific Heat is the amount of heat needed to raise the temperature of 1.0 grams of any substance exactly 1 co. Every substance absorbs heat, some more than others. Water has an extremely high heat capacity.

In the reverse process (freezing) energy (heat) is lost. Why do you get chill when you exit the shower? Heat of Vaporization = Energy needed to convert 1.0 Goff a liquid into a gas (or vapor). L to V, energy is absorbed by the liquid. V to L, energy is lost by the vapor. Heat mass X Heat of vaporization H_{ap} for water = 540 cal/g. Of water Heat of Fusion = Energy needed to convert 1.0 Goff a solid into a liquid. Heat = (mass) (Heat of fusion) Some substances go directly from the solid to the vapor phase. This process is called sublimation. Dry ice (CA), iodine (I₂), camphor, and menthol are examples.