

All problems on this paper will be solved using dimensional analysis. Non-credit will be assessed for any problem not including this set-up. Significant figures will also be strictly enforced.

1. Explain how you go about to solve a problem using dimensional analysis

2. Solve the following conversion problems
 - a. How many meters are there in 213 yards?
 - b. A certain sports drink contains 125 mg of sodium per 350 mL serving. What is this in ounces per fluid ounce?
 - c. The density of sapphire is 3.49 g/cm^3 . What is this density in lbs/in^3 ?
 - d. A reaction of 58.5 g of a certain compound released 3.169×10^3 joules of energy. How many calories of energy would 2.3×10^{-2} lbs of this material release in a similar process?

3. Solve the following problems.
 - a. The density of an unknown liquid was performed using a graduated cylinder. If the cylinder is accurate to the nearest mL and the meniscus is half way between 6^{th} and 7^{th} marks past the 10 mL mark, what is the density if the mass of the liquid is 12.88 g?
 - b. A 1.5 inch cubic block of aluminum metal has a mass of 5.265 ounces. Find the density of this in g/cm^3 . Is this pure aluminum or a mixture of aluminum and other metals?
 - c. Archimedes was able to determine if a golden crown was made of pure gold or a mixture of gold with lesser metals. If a 1.54 kg golden crown was placed in a vat of pure water at 4°C , how much water should the crown displace if it is pure gold?
 - d. If the 1.54 kg golden crown had displaced 68.5 mL of water, calculate the percent error in density of the mixture versus pure gold.