



Chem Skills Worksheet #9: Dimensional Analysis

1. The Star of India sapphire weighs 563 carats. A carat equals 200.0 mg. What is the mass of the gemstone in grams? $563 \text{ carats} \times 200 \text{ mg/carat} \times 1\text{g}/1000\text{mg} = 112.6 \text{ g}$



2. A sprinter runs the 120.0 yard dash in 11.0 seconds. Express her speed in miles per hour.



3. A jet airplane flies at the speed of 768 miles per hour. What is this speed in cm per second?

$$768 \text{ miles/hr} \times 1\text{hr}/3600 \text{ sec} \times 1.61 \text{ km}/1 \text{ mile} \times 1000\text{m}/1\text{km} \times 100\text{cm}/1\text{m} =$$

$$3.43 \times 10^4 \text{ cm/second}$$

4. The chemistry department is ordering test tubes. Each team receives 12 test tubes. There are 7 classes each with 32 students. The students work in four person teams. A box of test tubes contains 100 tubes and there are 5 boxes in each case. How many cases should BHS order?



5. A football field measures 100.0 yard long by 160.0 feet wide. What is the area in square meters?
(Area of field = length x width)



$$100 \text{ yd} \times 3\text{ft}/1\text{yd} \times 12\text{in}/1\text{ft} \times 2.54 \text{ cm}/1\text{inch} \times 1\text{m}/100\text{cm} = 91.44 \text{ m}$$

$$160.0 \text{ ft} \times 12\text{in}/1\text{ft} \times 2.54 \text{ cm}/1 \text{ inch} \times 1\text{m}/100 \text{ cm} = 48.77 \text{ m}$$

$$91.44 \text{ m} \times 48.77\text{m} = 4459.53 \text{ m}^2 = 4460 \text{ m}^2$$

6. The speed of light is 3.0×10^{10} cm/sec. Express this speed in km/hr?



7. The driver of a car uses one gallon of gasoline for every 24.6 miles driven. Express this in terms of kilometer per liter. $24.6 \text{ mi/gal} \times 1.61 \text{ km/1mi} \times 1 \text{ gal/4qts} \times 1.06 \text{ qt/1L} = 1049 \text{ km/L} = 1.05 \times 10^3 \text{ km/L}$



8. If the price of gas is \$2.85 per gallon. what is the cost per Liter?



9. A student swims 3.22 miles per hour. How many seconds will it take the student to swim 1.00 kilometer? $1 \text{ hr}/3.22 \text{ miles} \times 60 \text{ min}/1\text{hr} \times 60 \text{ sec}/1\text{min} \times 1\text{mile}/1.61 \text{ km} = 694 \text{ sec}$



10. School lasts 179 days. If you take 7 classes a day and they last an average of 51.0 minutes each, how many seconds are you in school each year?



11. A sample of seawater contains 6.277 g of sodium chloride per liter of solution. How many mg of sodium chloride would be contained in 15.0 mL of this solution?

$$6.277\text{g/L} \times 1\text{L}/1000\text{mL} \times 15.0\text{mL} \times 1000\text{mg}/1\text{g} = 94.2 \text{ mg}$$



12. A Jack rabbits can achieve speeds of about 68 km/h. How many minutes would it take him to run a mile?

