Université d'Ottawa
Faculté de génie

Département de
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uOttawa

University of Ottawa
Faculty of Engineering

Department of
Chemical and Biological Engineering

CHG 1125
QUIZ 1

Last Name: _____
First Name: _____
Student Number: _____

Duration: 30 minutes, closed textbook, closed notes.

1. Using an equation of units, carry out the following unit conversions (*8 points*):

(a) 2,000 yard = _____ meters

$$2000\ yd \times \frac{1\ ft}{\frac{1}{3} yd} \times \frac{1\ m}{3.2808\ ft} = 1829\ m$$

(b) 10,000 square kilometers = _____ square miles

$$10000\ km^2 \times \frac{(1000\ m)^2}{(1\ km)^2} \times \frac{(0.0006214\ mi)^2}{(1\ m)^2} = 3861\ mi^2$$

(c) 5 imperial gallons per minute = _____ liters per hour

$$5\ \frac{imp\ gal}{min} \times \frac{1000\ L}{220.83\ gal} \times \frac{60\ min}{1\ h} = 1159\ L/h$$

(d) 200 pound per square inch (psi) = _____ kilopascals

$$200\ psi \times \frac{101.325\ kPa}{14.696\ psi} = 1379\ kPa$$

2. A waste treatment pond is 40 m long and 20 m wide, and has an average depth of 3 m. The density of the waste is 100 lb_m/ft^3. Calculate the weight of the pond contents in lb_f. Show your calculations (12 *points*).

$$V = 40\ m \times 20\ m \times 3\ m = 2400\ m^3$$

$$2400\ m^3 \times \frac{1\ ft^3}{0.028317\ m^3} = 84\ 755\ ft^3$$

$$\rho = \frac{m}{V}$$

$$100\ \frac{lb_m}{ft^3} = \frac{m}{84\ 755\ ft^3}$$

$$m = 8\ 475\ 474\ lb_m$$

$$W = m \cdot \frac{g}{g_c} = (8\ 475\ 474\ lb_m)\left(32.174\ \frac{ft}{s^2}\right)\left(\frac{1\ lb_f}{32.174 lb_m\ \frac{ft}{s^2}}\right) = 8\ 475\ 474\ lb_f$$