Chapter One – Problems: 37, 50, 54

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37. 2 Acres $\rightarrow$ Hectares

$$2[\cancel{ac}] \cdot \frac{4.356 \cdot 10^4[\cancel{ft^2}]}{1[\cancel{ac}]} \cdot \frac{.0929[\cancel{m^2}]}{1[\cancel{ft^2}]} \cdot \frac{1[\text{ha}]}{10000[\cancel{m^2}]} = .8093[\text{ha}]$$

50. How long is a $10[lb]$ spool of 12-gauge (diameter of $.0808[in]$), with density 2.70 $[\text{g}\,\text{cm}^{-3}]$

$$10[lb] \rightarrow [\text{kg}] = 4.536[\text{kg}]$$
$$2.7[\text{g}\,\text{cm}^{-3}] = 2700[\text{kg}\,\text{m}^{-3}]$$
$$.0404[in] = .001026[\text{m}]$$
$$\pi r^2 l = \frac{4.536[\text{kg}]}{1000[\text{kg}\,\text{m}^{-3}]}$$
$$l = \frac{4.536[\text{kg}]}{2700[\text{kg}\,\text{m}^{-3}] \cdot \pi \cdot (.001026[\text{m}])^2}$$
$$l = 508[\text{m}]$$

54. Potassium sulfate has a solubility of 15[g]/100[g] of water at 40[°C]. A solution is prepared by adding 39[g] to 225[g] of water. Is the solution unsaturated, saturated, or supersaturated? If precipitation occurs, how many grams would you expect to crystallize out?

$$\frac{39}{225} > \frac{15}{100}$$

This means that the solution is supersaturated. Using proportionality, 33.75[g] of potassium sulfate would be needed to achieve a saturated solution in 225[g] of water. This means that $39 - 33.75 = 5.25$[g] of potassium sulfate would crystallize.