

44. (a) Using Appendix D, we have  $1 \text{ ft} = 0.3048 \text{ m}$ ,  $1 \text{ gal} = 231 \text{ in.}^3$ , and  $1 \text{ in.}^3 = 1.639 \times 10^{-2} \text{ L}$ . From the latter two items, we find that  $1 \text{ gal} = 3.79 \text{ L}$ . Thus, the quantity  $460 \text{ ft}^2/\text{gal}$  becomes

$$\left( \frac{460 \text{ ft}^2}{\text{gal}} \right) \left( \frac{1 \text{ m}}{3.28 \text{ ft}} \right)^2 \left( \frac{1 \text{ gal}}{3.79 \text{ L}} \right) = 11.3 \text{ m}^2/\text{L} .$$

- (b) Also, since  $1 \text{ m}^3$  is equivalent to  $1000 \text{ L}$ , our result from part (a) becomes

$$\left( \frac{11.3 \text{ m}^2}{\text{L}} \right) \left( \frac{1000 \text{ L}}{1 \text{ m}^3} \right) = 1.13 \times 10^4 \text{ m}^{-1} .$$

- (c) The inverse of the original quantity is  $(460 \text{ ft}^2/\text{gal})^{-1} = 2.17 \times 10^{-3} \text{ gal/ft}^2$ , which is the volume of the paint (in gallons) needed to cover a square foot of area. From this, we could also figure the paint thickness (it turns out to be about a tenth of a millimeter, as one sees by taking the reciprocal of the answer in part (b)).