

8. The total volume V of the real house is that of a triangular prism (of height $h = 3.0$ m and base area $A = 20 \times 12 = 240$ m²) in addition to a rectangular box (height $h' = 6.0$ m and same base). Therefore,

$$V = \frac{1}{2}hA + h'A = \left(\frac{h}{2} + h'\right)A = 1800 \text{ m}^3 .$$

- (a) Each dimension is reduced by a factor of $1/12$, and we find

$$V_{\text{doll}} = (1800 \text{ m}^3) \left(\frac{1}{12}\right)^3 \approx 1.0 \text{ m}^3 .$$

- (b) In this case, each dimension (relative to the real house) is reduced by a factor of $1/144$. Therefore,

$$V_{\text{miniature}} = (1800 \text{ m}^3) \left(\frac{1}{144}\right)^3 \approx 6.0 \times 10^{-4} \text{ m}^3 .$$