

83. For isotropic materials, the coefficient of linear expansion α is related to that for volume expansion by $\alpha = \frac{1}{3}\beta$ (Eq. 19-11). The radius of Earth may be found in the Appendix. With these assumptions, the radius of the Earth should have increased by approximately

$$\begin{aligned}\Delta R_E &= R_E \alpha \Delta T \\ &= (6.4 \times 10^3 \text{ km}) \left(\frac{1}{3} \right) (3.0 \times 10^{-5} / \text{K}) (3000 \text{ K} - 300 \text{ K}) \\ &= 1.7 \times 10^3 \text{ km} .\end{aligned}$$