38. (a) Using Eq. 21-12 and Eq. 21-14, we obtain

$$|W| = \frac{|Q_{\mathrm{L}}|}{K_C} = (1.0\,\mathrm{J})\left(\frac{300\,\mathrm{K} - 280\,\mathrm{K}}{280\,\mathrm{K}}\right) = 0.071\ \mathrm{J}\ .$$

(b) A similar calculation (being sure to use absolute temperature) leads to 0.50 J in this case.

(c) with $T_{\mathrm{L}} = 100$ K, we obtain $|W| = 2.0$ J.

(d) Finally, with the low temperature reservoir at 50 K, an amount of work equal to $|W| = 5.0$ J is required.