38. (a) The work-kinetic energy theorem applies as well to Einsteinian physics as to Newtonian; the only difference is the specific formula for kinetic energy. Thus, we use $W = \Delta K$ where $K = m_e c^2(\gamma - 1)$ (Eq. 38-49), and $m_e c^2 = 511\,\text{keV} = 0.511\,\text{MeV}$ (Table 38-3). Noting that $\Delta K = m_e c^2(\gamma_f - \gamma_i)$, we obtain

$$W = m_e c^2 \left(\frac{1}{\sqrt{1-\beta_f^2}} - \frac{1}{\sqrt{1-\beta_i^2}} \right) = (511\,\text{keV}) \left(\frac{1}{\sqrt{1-(0.19)^2}} - \frac{1}{\sqrt{1-(0.18)^2}} \right) = 0.996 \text{ keV} .$$

(b) Similarly,

$$W = (511\,\text{keV}) \left(\frac{1}{\sqrt{1-(0.99)^2}} - \frac{1}{\sqrt{1-(0.98)^2}} \right) = 1055 \text{ keV} .$$

We see the dramatic increase in difficulty in trying to accelerate a particle when its initial speed is very close to the speed of light.