32. (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 $W = \Delta K = m_e c^2(\gamma - 1)$ (Eq. 38-49) and $m_e c^2 = 511\,\text{keV} = 0.511\,\text{MeV}$ (Table 38-3), and obtain

$$W = m_e c^2 \left(\frac{1}{\sqrt{1-\beta^2}} - 1 \right) = (511\,\text{keV}) \left[\frac{1}{\sqrt{1-(0.50)^2}} - 1 \right] = 79\ \text{keV} \ .$$

(b)

$$W = (0.511\,\text{MeV}) \left(\frac{1}{\sqrt{1-(0.990)^2}} - 1 \right) = 3.11\ \text{MeV} \ .$$

(c)

$$W = (0.511\,\text{MeV}) \left(\frac{1}{\sqrt{1-(0.9990)^2}} - 1 \right) = 10.9\ \text{MeV} \ .$$