26.17 The momentum of the electron is

$$p_e = \gamma m_e v = \frac{\left(9.11\times10^{-31}\ \text{kg}\right)(0.90c)}{\sqrt{1-(0.90)^2}} = \left(1.9\times10^{-30}\ \text{kg}\right)c$$

If the proton has the same momentum, then

$$p_p = \gamma m_p v = \frac{\left(1.67\times10^{-27}\ \text{kg}\right)v}{\sqrt{1-(v/c)^2}} = \left(1.9\times10^{-30}\ \text{kg}\right)c$$

which reduces to $\left(8.9\times10^{2}\right)(v/c) = \sqrt{1-(v/c)^2}$ and yields

$$v = \left(1.1\times10^{-3}\right)c = \left(1.1\times10^{-3}\right)\left(3.0\times10^{8}\ \text{m/s}\right) = \boxed{3.3\times10^{5}\ \text{m/s}}$$

26.28 (a) $E_R = mc^2 = \left(1.67\times10^{-27}\ \text{kg}\right)\left(3.00\times10^{8}\ \text{m/s}\right)^2\left(\dfrac{1\ \text{MeV}}{1.60\times10^{-13}\ \text{J}}\right) = \boxed{939\ \text{MeV}}$

(b) $$E = \gamma mc^2 = \gamma E_R = \frac{E_R}{\sqrt{1-(v/c)^2}}$$

$$= \frac{939\ \text{MeV}}{\sqrt{1-(0.950)^2}} = 3.01\times10^{3}\ \text{MeV} = \boxed{3.01\ \text{GeV}}$$

(c) $KE = E - E_R = 3.01\times10^{3}\ \text{MeV} - 939\ \text{MeV} = 2.07\times10^{3}\ \text{MeV} = \boxed{2.07\ \text{GeV}}$

26.39 $KE = E - E_R = (\gamma - 1)E_R$

so $\gamma = 1 + \frac{KE}{E_R} = \frac{1}{\sqrt{1-(v/c)^2}}$ giving $v = c\sqrt{1 - \frac{1}{(1+KE/E_R)^2}}$

(a) When $KE = q(\Delta V) = e(500\text{ V}) = 500\text{ eV}$, and $E_R = 939\text{ MeV}$, this yields

$$v = c\sqrt{1 - \frac{1}{\left[1 + 500\text{ eV}/(939\times10^6\text{ eV})\right]^2}} = 1.03\times10^{-3}\,c = \boxed{3.10\times10^5\text{ m/s}}$$

(b) When $KE = q(\Delta V) = e(5.00\times10^8\text{ V}) = 500\text{ MeV}$

$$v = c\sqrt{1 - \frac{1}{(1 + 500\text{ MeV}/939\text{ MeV})^2}} = \boxed{0.758c}$$

26.40 From $E^2 = (pc)^2 + E_R^2$ with $E = 5E_R$, we find that $p = \dfrac{E_R\sqrt{24}}{c}$

(a) For an electron, $p = \dfrac{(0.511\text{ MeV})\sqrt{24}}{c} = \boxed{2.50\text{ MeV}/c}$

(b) For a proton, $p = \dfrac{(939\text{ MeV})\sqrt{24}}{c} = 4.60\times 10^3\ \dfrac{\text{MeV}}{c} = \boxed{4.60\text{ GeV}/c}$