14. (a) The mass number A is the number of nucleons in an atomic nucleus. Since $m_p \approx m_n$ the mass of the nucleus is approximately Am_p. Also, the mass of the electrons is negligible since it is much less than that of the nucleus. So $M \approx Am_p$.

(b) For ^{1}H, the approximate formula gives $M \approx Am_p = (1)(1.007276\,\mathrm{u}) = 1.007276\,\mathrm{u}$. The actual mass is (see Table 47-1) $1.007825\,\mathrm{u}$. The percent error committed is then $\delta = (1.007825\,\mathrm{u} - 1.007276\,\mathrm{u})/1.007825\,\mathrm{u} = 0.054\%$. Similarly, $\delta = 0.50\%$ for ^{7}Li, 0.81% for ^{31}P, 0.83% for ^{81}Br, 0.81% for ^{120}Sn, 0.78% for ^{157}Gd, 0.74% for ^{197}Au, 0.72% for ^{272}Ac, and 0.71% for ^{239}Pu.

(c) No. In a typical nucleus the binding energy per nucleon is several MeV, which is a bit less than 1% of the nucleon mass times c^2. This is comparable with the percent error calculated in part (b), so we need to use a more accurate method to calculate the nuclear mass.