IB Physics
FA 30.1 - Radioactive Decay

Name_____

What you will miss least about TuHS_____

Show your work, circle your answers, and use sig figs to receive full credit.

1 u = 1.6605×10^{-27} kg = 931.5 MeV, $^{1}_{0}n$ = 1.008665 u

1. Find the missing particle or nucleus in these decays: (These are fictitious - ignore neutrinos for now)

$^{83}_{39}Y \rightarrow ?? + \alpha$	$?? \rightarrow {}^{49}_{22}Ti + \beta^-$	$^{50}_{24}Cr \rightarrow {}^{50}_{23}V + ??$	$^{54}_{26}Fe \rightarrow ?? + \gamma$
$^{79}_{37}Rb$	$^{49}_{21}Sc$	β^+	$^{54}_{26}Fe$

2. What is the kinetic energy of the alpha particle that ^{208}Po (m = 207.981222 u) gives off becoming ^{204}Pb (m = 203.973020) in MeV?

3. Imagine it is possible for $^{14}_{7}N$ undergo both β^- and β^+ decay. Write the complete decay equation below for each (complete with neutrino or anti-neutrino)

$^{14}_{7}N \rightarrow {}^{14}_{8}O + \beta^- + \overline{\upsilon_e}$
$^{14}_{7}N \rightarrow {}^{14}_{6}C + \beta^+ + \upsilon_e$

4. You have 24.0 grams of a radioactive substance with a half life of 14.0 minutes. In what time will you have 3.00 grams of it left?

5.The activity of a sample with a half-life of 23.5 minutes is initially 3.412×10^6 counts/second. What will it be in 6.00 hours?

If K-40(m = 39.964 u) had a half life of 14.0 hours, (It's actually stable) what would be the activity of 0.0240 grams of it?