Anomalous X-ray Pulsars (AXPs) and Soft Gamma Repeaters (SGRs) form a group of neutron stars that are believed to be magnetars—neutron stars with extremely strong magnetic fields ($B \sim 10^{14} \text{–} 10^{15} \text{G}$). In a magnetar, strong magnetic field of the neutron star is the source of intriguing observational characteristics, such as, bright X-ray emission ($10^{33} \text{–} 10^{36} \text{erg s}^{-1}$), sporadic emission of bursts with energies ranging between $10^{38} \text{–} 10^{47} \text{erg}$ and rapid spin down rates. The magnetic field strengths of AXPs and SGRs are usually inferred from their spin properties or from the energetics of luminous bursts. We have recently developed a theoretical model that takes into account physical processes in the atmosphere and magnetosphere of a strongly magnetized neutron star. We use this model to fit the observed X-ray spectra of AXPs. We find that the X-ray spectra of AXPs are described very well with our model and resulting surface magnetic field strength measurements are in good agreement with those inferred from the spin behavior of neutron stars.