MS exam, Radio & Space Science (ECE 222B) question, Fall 2011

Consider a microstrip line with the top conducting plate of width W and plate separation H. The region between the plates is filled with dielectric, with the width equal to the width of the top plate. Region outside is air.

a) Microstrips are normally designed for single-mode operation. When we say this mode is quasi-TEM what do we mean?
b) Why can't the microstrip support a rigorous (exactly) TEM mode?
c) At what wavelength should the quasi-TEM behavior breakdown? Why?
d) Now assume that the dielectric between the plates has extremely high permittivity. Sketch the field lines inside the dielectric.
e) Give the characteristic impedance of the line for the high dielectric case.