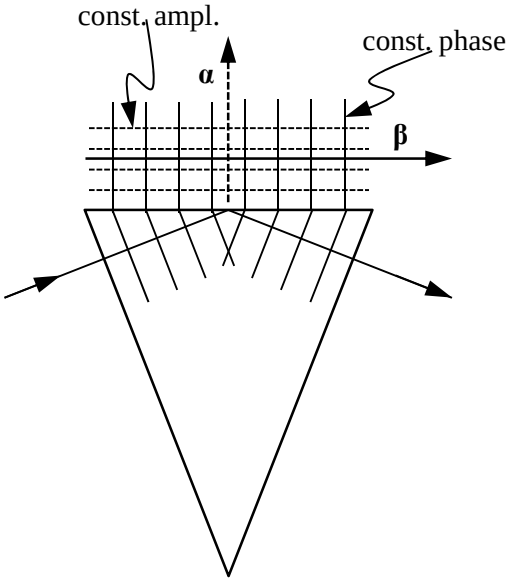
Answers

1. a. The fields in the upper region are an evanescent wave. This is a nonuniform plane wave with complex propagation vector $\boldsymbol{\gamma} = \boldsymbol{\alpha} + j\boldsymbol{\beta}$. In a lossless medium, a nonuiform plane wave must have $\boldsymbol{\alpha} \perp \boldsymbol{\beta}$. The evanescent wave propagates parallel to the boundary but is attenuated exponentially away from the boundary. Surfaces of constant phase and amplitude are perpendicular to $\boldsymbol{\beta}$ and $\boldsymbol{\alpha}$, respectively, as shown. There is a flow of energy along the surface, but since the plane wave is implicitly assumed to be infinite in cross section, no energy enters or leaves the system. The surfaces of constant phase are continuous across the boundary. This continuity is a consequence of the wave nature of the fields, and has nothing to do with their vector nature (as do the the continuity of normal **B**, **D** and tangential **H**, **E**).



b. When the gap width *d* is zero, all of the light propagates forward into the second prism. As *d* increases, the transmitted amplitude decreases exponentially.