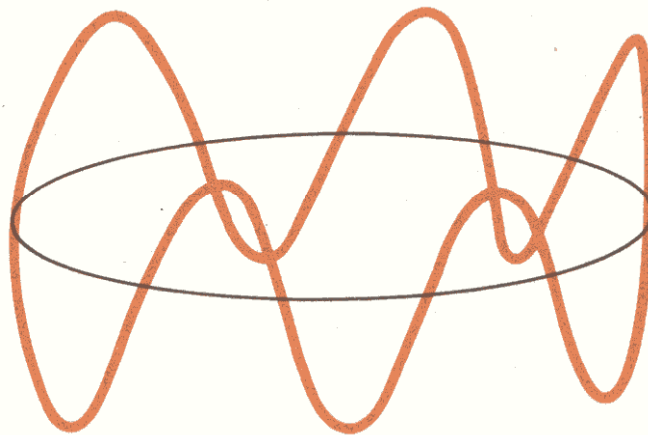




(a)



(b)

**FIGURE 12-8** Standing waves. (a) First overtone (excited state) of a guitar string. Note the node in the middle. (b) Circular standing wave on a closed loop (the fifth overtone, with ten nodes).