Extra

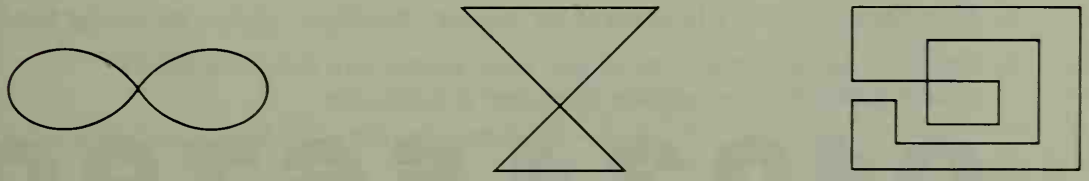
Topology

In the geometry we have been studying, our interest has been in congruent figures and similar figures, that is, figures with the same size and shape or at least the same shape. If we were studying the branch of geometry called *topology*, we would be interested in properties of figures that are even more basic than size and shape. For example, imagine taking a rubber band and stretching it into all kinds of figures.

These figures have different sizes and shapes, but they still have something in common: Each one can be turned into any of the others by stretching and bending the rubber band. In topology figures are classified according to this kind of family resemblance. Figures that can be stretched, bent, or molded into the same shape without cutting or puncturing belong to the same family and are called *topologically equivalent*. Thus circles, squares, and triangles are equivalent. Likewise the straight line segment and wiggly curves below are equivalent.

Notice that to make one of the figures above out of the rubber band you would have to cut the band, so these two-ended curves are not equivalent to the closed curves in the first illustration.

Suppose that in the plane figures below, the lines are joined where they cross. Then these figures belong to a third family. They are equivalent to each other but not to any of the figures above.



One of the goals of topology is to identify and describe the different families of equivalent figures. A person who studies topology (called a *topologist*) is interested in classifying solid figures as well as figures in a plane. For example, a topologist considers an orange, a teaspoon, and a brick equivalent to each other.