**Diagonally Speaking**

*How many diagonals does a polygon have?*

A diagonal is a line segment that connects two vertices of a polygon but is not a side of the polygon. For example, in a pentagon ABCDE, segment AC is a diagonal and segment CD is a side of the polygon.

ABCDE has five diagonals (draw a sketch to confirm this).

As you might expect, the number of diagonals in a polygon depends on the number of sides it has (which is the same as the number of vertices it has).

1. Experiment by drawing various polygons and finding out how many diagonals each has. Organize the results in an *In*-*Out* table (sometimes called a “T chart”) in which the *In* is the number of sides of the polygon and the *Out* is the number of diagonals.
2. Look for a pattern for your *In*-*Out* table. If you find a pattern, see if you can use it to figure out how many diagonals a 12-sided polygon has. Try to confirm your result by drawing and actually counting the diagonals.
3. Think about *why* your pattern holds. That is, why should the number of diagonals in a polygon follow this pattern? Write down any explanations you come up with.