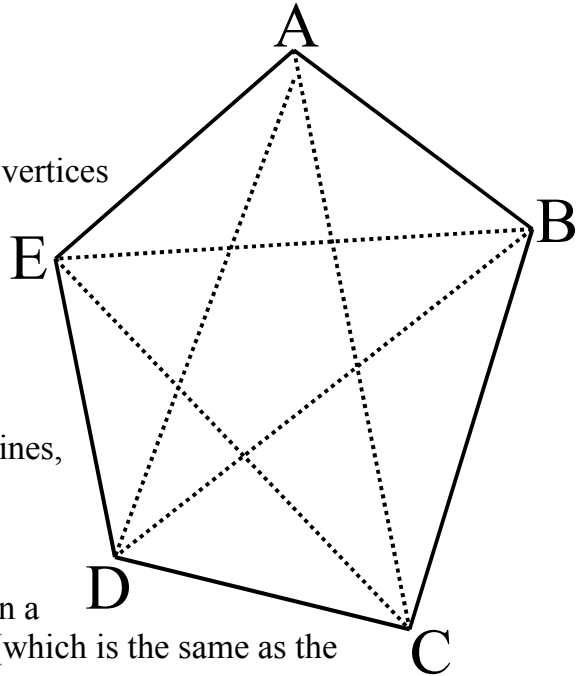# Diagonally Speaking

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 the diagram at the right,
segment *AC* is a diagonal and segment *CD* is a
side of the polygon.

The diagram shows all the diagonals as dotted lines,
and this polygon has five diagonals.

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 in which the *In* is the number of
sides of the polygon and the *Out* is the number of diagonals.

2. a. Look for a pattern in your table.

b. Once you have found a pattern, use it to figure out how many diagonals a
12-sided polygon has. Try to confirm your result by actually drawing a 12-sided
polygon and 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.

Mr. Baldus