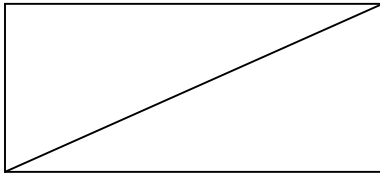# How Many Triangles?

In this activity, you will use the HP 39gs to explore the number of triangles that are created when diagonals are drawn from each vertex of a polygon.

Exercise 1

You will begin by drawing polygons. A quadrilateral with a diagonal drawn is shown below.

Draw polygons with 5, 6, 7, and 8 sides. Then choose a vertex and draw a diagonal to each vertex. Record the number of triangles that are created in the table below.

a.   Record the number of triangles you create.

Number of Sides in the Polygon	Number of Triangles Created
3	1
4	2
5	
6	
7	
8	

b.   What do you notice about the relationship between the number of sides in the polygon and the number of triangles created?

c.   Suppose you had a polygon with 50 sides. Predict the number of triangles that would be formed.

d.   Suppose you knew 98 triangles could be formed from diagonals. How many sides would the original polygon have?

Exercise 2
Use your HP 39gs to verify your conjecture from Exercise 1. Press the APLET key and choose **Function**. You will be in the Function Symbolic View and see a screen like Figure 1. Enter your guess in $F1(X)$.

```
▓▓▓▓FUNCTION SYMBOLIC VIEW▓▓▓▓
 F1(X)=
 F2(X)=
 F3(X)=
 F4(X)=
 F5(X)=                        ▼
 EDIT ✔CHK   X       SHOW EVAL
```
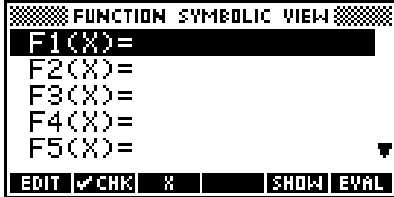Figure 1

Press the SHIFT of the NUM key (Numeric SetUp) to set up the table of values you will create. Your screen should look like the one in Figure 2.

```
▓▓▓▓FUNCTION NUMERIC SETUP▓▓▓▓
NUMSTART: 8
NUMSTEP:  1
NUMTYPE:  Build Your Own
NUMZOOM:  4

ENTER STARTING VALUE FOR TABLE
 EDIT              PLOT▶
```
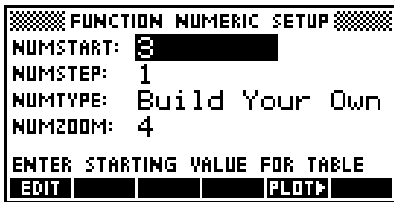Figure 2

Press the NUM key and you will see an empty table (see Figure 3). As you enter values of X (the number of sides of the polygon), the value for $F1$ (the number of triangles created) will appear.

```
   X        F1
 ─────────────────────────────

 EDIT  INS  SORT  BIG  DEFN
```
Figure 3

Write the table values from your calculator below. Make sure they match the table values you have from Exercise 1. If they do not, you need to change your guess in $F1(X)$ until the tables are the same.

Number of Sides in the Polygon	Number of Triangles Created