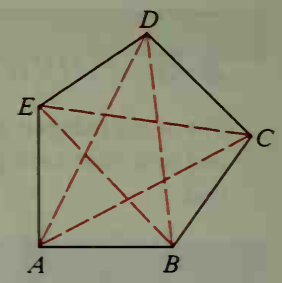
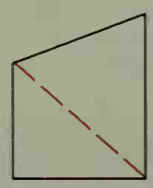
When referring to a polygon, we list its consecutive vertices in order. Pentagon *ABCDE* and pentagon *BAEDC* are two of the many correct names for the polygon shown at the right.

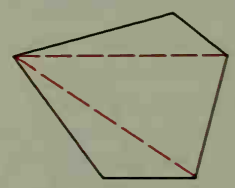


A segment joining two nonconsecutive vertices is a **diagonal** of the polygon. The diagonals of the pentagon at the right are indicated by dashes.

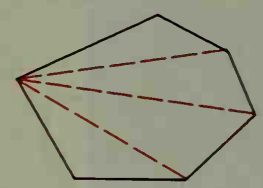
To find the sum of the measures of the angles of a polygon draw all the diagonals from just *one* vertex of the polygon to divide the polygon into triangles.



4 sides, 2 triangles
Angle sum = 2(180)



5 sides, 3 triangles
Angle sum = 3(180)



6 sides, 4 triangles
Angle sum = 4(180)

Note that the number of triangles formed in each polygon is two less than the number of sides. This result suggests the following theorem.

Theorem 3-13

The sum of the measures of the angles of a convex polygon with n sides is $(n - 2)180$.

Since the sum of the measures of the *interior* angles of a polygon depends on the number of sides, n, of the polygon, you would think that the same is true for the sum of the exterior angles. This is *not* true, as Theorem 3-14 reveals. The experiment suggested in Exercise 7 should help convince you of the truth of Theorem 3-14.

Theorem 3-14

The sum of the measures of the exterior angles of any convex polygon, one angle at each vertex, is 360.

Example 1 A polygon has 32 sides. Find (a) the sum of the measures of the interior angles and (b) the sum of the measures of the exterior angles, one angle at each vertex.

Solution (a) Interior angle sum = $(32 - 2)180 = 5400$ (Theorem 3-13)
(b) Exterior angle sum = 360 (Theorem 3-14)