A **polygon** is a two-dimensional closed figure of three or more line segments (sides) connected end to end. Each segment is a side and only intersects the endpoints of the two adjacent sides. Each point of intersection is a vertex. At right are two examples of polygons.

**Example**

Which of the following are polygons? If not, explain why not.

Shapes A, C, and F are polygons. Shape B is not connected. Some of the sides in shape D intersect more than two other sides. Shape E is not completely made by line segments.

**Problems**

Determine if each shape is a polygon.

1.  
2.  
3.  
4.  
5.  
6.
NAMING POLYGONS

Polygons are named by the number of sides they have.

<table>
<thead>
<tr>
<th>sides</th>
<th>name</th>
<th>sides</th>
<th>name</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>triangle</td>
<td>8</td>
<td>octagon</td>
</tr>
<tr>
<td>4</td>
<td>quadrilateral</td>
<td>9</td>
<td>nonagon</td>
</tr>
<tr>
<td>5</td>
<td>pentagon</td>
<td>10</td>
<td>decagon</td>
</tr>
<tr>
<td>6</td>
<td>hexagon</td>
<td>12</td>
<td>dodecagon</td>
</tr>
<tr>
<td>7</td>
<td>heptagon</td>
<td>n</td>
<td>n–gon</td>
</tr>
</tbody>
</table>

A polygon is **convex** if each of the interior angles measures less than 180°. If a polygon has any interior angle measuring greater than 180° (a reflex angle), then the polygon is non-convex or **concave**.

**Example**

Name each polygon by the number of sides and determine if it is convex or concave.

This polygon has six sides so it is a hexagon. There are two interior angles measuring greater than 180° so it is concave.  

This polygon has four sides so it is a quadrilateral. All of the interior angles measure less than 180° so it is convex.

**Problems**

Name each polygon by the number of sides and determine if it is convex or concave.

7.  

8.  

9.
If all of the sides of a polygon are congruent, it is called \textbf{equilateral}. If all of the angles are congruent, it is called \textbf{equiangular}. If a polygon is both equilateral and equiangular, then it is a \textbf{regular} polygon.

\textbf{Example}

Determine if each polygon is regular.

\begin{itemize}
  \item This polygon is equilateral but not equiangular so it is not regular.
  \item This polygon is equilateral but not equiangular so it is not regular.
  \item This polygon is equilateral and equiangular so it is regular.
\end{itemize}

\textbf{Problems}

Determine if each polygon is equilateral, equiangular, or regular.

\begin{itemize}
  \item 10.
  \item 11.
  \item 12.
\end{itemize}

\textbf{Answers}

\begin{itemize}
  \item 1. not a polygon
  \item 2. not a polygon
  \item 3. polygon
  \item 4. not a polygon
  \item 5. polygon
  \item 6. not a polygon
  \item 7. convex pentagon
  \item 8. concave pentagon
  \item 9. concave hexagon
  \item 10. regular
  \item 11. equilateral
  \item 12. equiangular