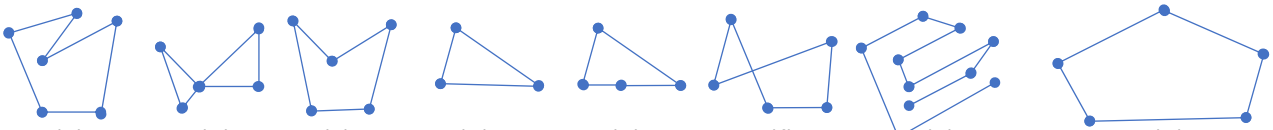
How Polygons are Drawn in this Book

About polygons. A traditional polygon is a closed object created by connecting a number of line segments, ***n***, to one another in sequential order. A closed object means that the starting point and the ending point are the same. It is worthwhile to call the starting point P_0 and the final point P_n and to note that, since the system is closed, $P_0 = P_n$. That way we can describe the segment number by its endpoint. The points and line segments are subject to the following three properties:

(1) All points (except the noted $P_0 = P_n$) are different from one another.
(2) The line segments cannot intersect (meaning cross-over one another), except at their endpoint.
(3) No two line segments with a common endpoint are collinear (meaning on the same line).

The endpoints are called *Vertices*, and the line segments are called *Sides*.

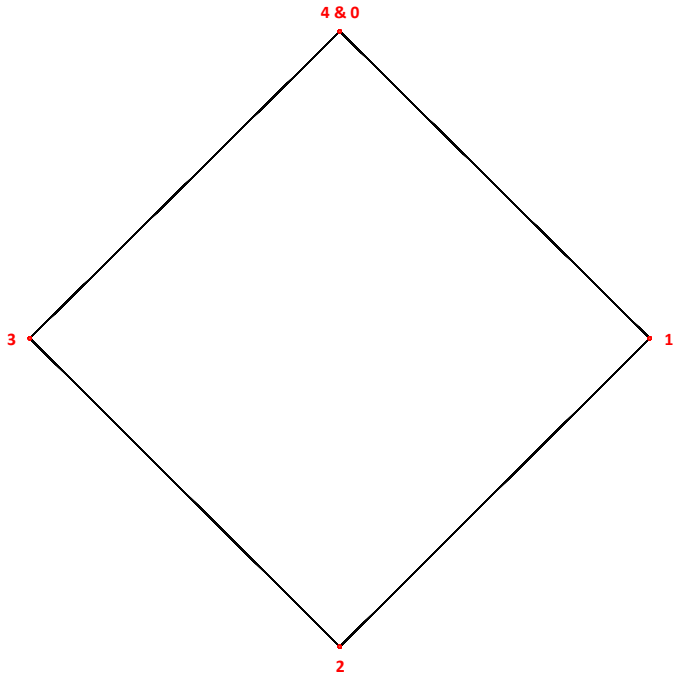
It is worth considering what happens if one of these properties is not followed. Consider images (a)-(h): Which are polygons, and which are not polygons? If the image is not a polygon which property is violated? (Answers are below.)

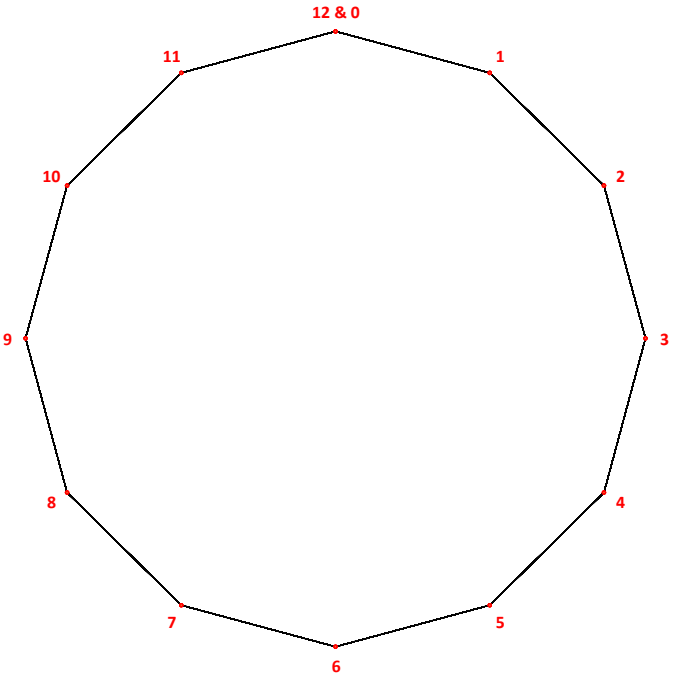


About regular polygons. Regular polygons occur if all of the sides and all of the angles are the same size. A regular ***n*** sided polygon, called an ***n***-gon, is most easily visualized by drawing a circle and then positioning ***n*** points equally spaced from one another. Once these ***n*** equidistant points are positioned, draw lines between points that are next to one another (adjacent points) and a regular ***n***-gon results.

Drawing the polygon. Once you have identified the points in a regular polygon, you need only connect adjacent points with line segments until you end up where you started to draw the polygon. This always involves two choices: **a)** Where do you start, and **b)** Which direction do you go around the circle?

How this book draws polygons. This book always starts at the top of the circle containing the vertices and draws (or counts) in a clockwise direction. The images below show a square and a 12-gon. The 12-gon should feel comfortable because this is just a clock-face (and it is why we use these rules).





Answers) Images (a), (c), (d), and (h) are polygons. Image (b) violates 1, (e) violates 3, (f) violates 2, and (g) violates the image being closed. It is worth emphasizing that (a) and (c) are not convex but are still polygons where (a) is a hexagon and (c) is a pentagon.