Previously when we defined figures it was primarily as a pre-definition to circles. Now we need to take a more in-depth look at figures. You may remember that a figure is an enclosed shape that lies in a plane, and that a figure can be made of line segments, curves, or combinations of these. You may recall I claimed the following are all figures.

\[\text{Figures A and C are convex.} \]

Figures B and D are concave. Figures L-O are polygons. What about figures L-O?

If a figure is made ONLY of straight line segments, then Euclid called it **rectilinear**. We usually just call it a **polygon**. Which term do you like? The figure A above is not rectilinear. Figures B, C and D are all rectilinear. Which of the figures L-O are polygons?

A polygon in which every side and every angle is equal is called a **regular** polygon. All of the polygons shown above are irregular polygons. Figures F-H below are regular polygons.
Lesson 3.2 -- Types of Triangles

A triangle is a polygon formed with three sides. I hope you knew that already. All triangles are convex polygons. I am not proving that here, but see if you can't prove it to yourself. Try to draw a convex triangle. Triangles are described by the relations between the sides, and the magnitude of the interior angles.

The first three descriptions are based on the length of the sides.

An equilateral triangle has three sides that are the same. An equilateral triangle is a regular polygon. These are examples of equilateral triangles.

An isosceles triangle is one where two sides are the same (so you may notice that an equilateral triangle is a special case of an isosceles triangle). This shows some isosceles triangles.

A scalene triangle is one where none of the sides are the same. Here are a few scalene triangles.

The next three descriptions are based on the measure of the interior angles.

If one of the interior angles is a right angle, then the triangle is a right triangle. The following are all right triangles. Notice most right triangles are also scalene. There exists one type of right triangle that is also an isosceles triangle. No right triangles are also equilateral triangles.

If one of the interior angles is obtuse, then the triangle is an obtuse triangle. Obtuse triangles can be either scalene or isosceles. Here are some obtuse triangles.
If all of the interior angles of a triangle are acute, then it is an **acute** triangle. Acute triangles can be scalene, isosceles or even equilateral. However, only one type of acute triangle is equilateral. These are some acute triangles.

These definitions align fairly well with Euclid's original definitions.

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**Lesson 3.3 -- Types of Quadrilaterals**

A **quadrilateral** is a polygon formed with four sides. That may be an unfamiliar term. You are probably more familiar with the types of quadrilaterals. Quadrilaterals can be concave or convex. The types of quadrilaterals are based on the lengths of the sides and the measures of the interior angles.

A **square** is a quadrilateral with all four sides equal and all angles being right angles. Since all right angles are equal, a square has four equal angles. This means that a square is a regular polygon. It turns out that the opposite sides of a square are parallel. Here are some squares (just in case you forgot :) ).

A **rectangle** is a quadrilateral with all right angles (so a square is a special case of a rectangle). Rectangles also have opposite sides that are equal and parallel. These are examples of rectangles.

A **rhombus** is a quadrilateral with all four sides equal, but not necessarily the angles. Therefore, the square is also a special case of a rhombus. Rhombi also have opposite sides that are parallel. Here are some rhombi.

A **parallelogram** is a quadrilateral with opposite sides that are equal and parallel, but the angles do not need to be right. Therefore, squares, rectangles, and rhombi are all special cases of parallelograms. Cool? Here are some parallelograms.
A trapezoid is a quadrilateral with one pair of parallel sides. These are all trapezoids.

Lesson 3.4 -- More Polygons

The remaining polygons are all named with the general form \( n \)-gon, where \( n \) is a prefix that indicates the number of sides. The prefixes are either Latin or Greek, and the actual prefix is not always agreed upon. In this class, the goal is just to be familiar with these, so don't worry if you can't remember all the prefixes.

A **pentagon** is a five-sided polygon. Pentagons can be regular or irregular. Which of the pentagons below is the regular pentagon?

A **hexagon** is a six-sided polygon. The image below shows regular and irregular hexagons.

A **heptagon** is a seven-sided polygon. Here are a few heptagons.

An **octagon** is an eight-sided polygon. Some octagons!

Okay, there are more, but you can look these up yourself. :)