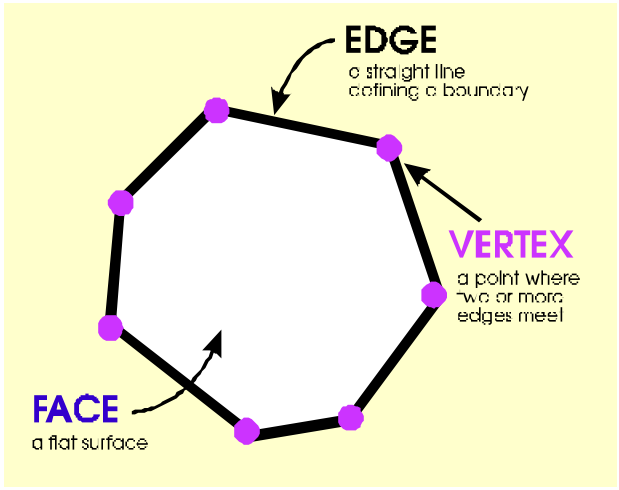
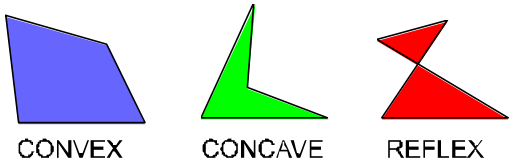
About Polygons...

Polygons

A polygon is a flat surface with three or more straight edges.



Polygons can be classified by the number of vertices, the lengths of edges and the inside angles. A triangle is a polygon with three sides. A quadrilateral is a polygon with four sides.



Reflex

For a reflex polygon, the lines cross forming separate polygons joined at a vertex.

Convex

In a convex polygon, a straight line between any two vertices lies completely within the shape.

Concave

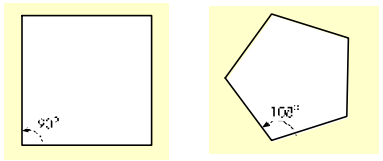
In a concave polygon none of the lines cross; however there will be at least one set of vertices for which the connecting straight line lies outside the polygon.

Regular Polygons

When all the edges are the same length, the polygon is called a "regular" polygon.

The Square

A square is a regular polygon with 4 sides. In a square all the sides are the same length and all the inside angles are the same. Each inside angle is 90 degrees. An angle that is 90 degrees is called a right angle. Right angles are formed by perpendicular lines.

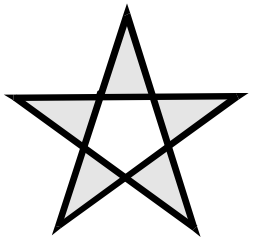


The pentagon

The pentagon is a regular polygon with 5 sides. In a pentagon, all the sides are the same length. All the inside angles are the same, too. Each inside angle is 108 degrees.

Lunchbox Math Bytes

easy to digest mathematics for your lunchbox



The Pentastar

Paper Plate Math ("Plate-onics")

Regular Polygons

Part 2: Squares and Pentagons

You will need to pack:

3 Paper plates or Coffee Filters or Circular papers
1 Pencil

Regular polygons cut from paper are great for craft projects. Here is an easy way to make a pentagon and a square that just fits inside a given circle.

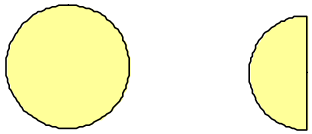
You need:

A pencil

Two Paper Circles (Paper Plate, Coffee Filter, cut paper, etc.)

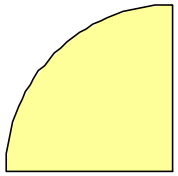
To make the square or pentagon shape

First we need to know the length of the *radius* of the circle. The *radius* is the distance from the center of the circle to any point on the circle. Start with one paper circle.



Fold the circle in half to get this shape:

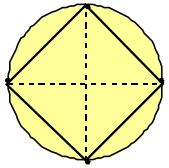
Fold the shape in half again to get one fourth of the circle. The length along one of the sides of the quarter circle is the *radius*.



This length is the radius.

To make the square:

Unfold the circle. Now use a straight edge draw four lines connecting the points where the fold line meets the circle edge.



Squares are Quadrilaterals:

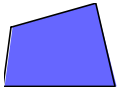
A quadrilateral is a polygon that has four edges.

Quadrilaterals are classified based on topology or overall shape arising from the angles at the vertices inside the sides and on the lengths of the edges.

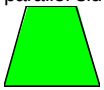
Convex quadrilaterals are classified based on lengths or on relative positions of edges.

Classification by positions of sides

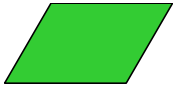
general quadrilateral
no pairs of parallel sides



trapezium
one pair of parallel sides



parallelogram
two pairs of parallel sides

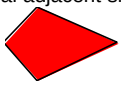


Classifications by lengths of sides

general quadrilateral
all four sides are different

parallelogram
equal opposite sides

kite
equal adjacent sides

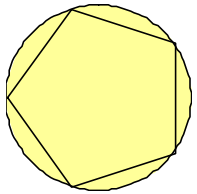


rhombus
all four sides are equal

To make the pentagon:

The easiest way to find the five points is to measure 108 degrees between each point using a protractor.

If you don't have a protractor, then find the radius. Now fold a rectangle the shape of a radius in half 3 times so that it has 8 equal lengths at fold marks. Five of the lengths is roughly the length between decagon (10 sided) points on the circle.



Use this measure to mark off 10 points. Connect every other point to make a pentagon.

Pentagon Secrets

The word root "penta" means five. A Pentagon can make a pentastar or pentagram (5 pointed star).

There are four basic line lengths of the pentastar. The ratio of any one to the next larger one is a golden ratio.

Since "5" is a Fibonacci number, pentagons are found many places in nature: sand dollars, starfish, flowers, and sliced fruit.